

Competence Profiles – Guidance for applicants and assessors

PART 2 – INDUSTRY CLASSIFICATION – BUILDING SERVICES

Introduction

Building Services Engineering is a well-established discipline within the engineering field and, although there are some very large organisations managing multi-million pound projects, there are still many small to medium sized companies carrying out contracts of substantial value or technically advanced projects of different types.

In general terms the industry is divided into the following categories:

Consultants	Undertaking primarily design work
Local and Health Authorities	Undertaking design and/or installation and/or maintenance
Contractors	Undertaking installation and/or maintenance
Design Contractors	Undertaking design and installation work
End users	Involved in procurement, awarding contracts, operation, installation and maintenance
Manufacturing	Involved in product design, development, manufacture, sales, etc.

In technical respects the field of Building Services can be very diverse and, typically, any one engineer could be involved in several of the following areas:

Air Conditioning	Lifts and Escalators
Alternative Energy	Mechanical Handling
Automatic Controls and Building Management Systems	Mechanical Ventilation
Central Heating and Boiler Plant Installations	Pneumatic Conveyors
Combined Heat and Power and Emergency Power Generation	Power Factor Correction
Compressed Air Services	Project Management
Data Communications	Refrigeration
Electrical distribution	Special Piped Service / medical gases.
Energy Conservation and Management	Steam Generation and Distribution
External Sewage	Telephones
Fire Protection and Alarms	Thermal Insulation
Hot and Cold Water Services	Uninterruptible Power Supplies
Internal Drainage	Vacuum Systems
	Vibration and Acoustic Controls
	Waste Disposal
	Water Treatment

Requirements for election or transfer to Member

In larger companies it is sometimes possible to discover approximate levels of responsibility from job titles but within smaller companies this is not usually the case. In general, therefore, it will not be appropriate to recommend election to Member on the basis of job title or grade alone.

In the case of applicants employed by contractors and public authorities, assessors will need to investigate levels of technical authority; responsibility for design solutions; and responsibility for cost compliance, tender specifications and performance demonstrations. In particular, contractors' employees should be asked to explain what proportion of their time is involved in making technical design changes and evaluating the results of performance tests.

Applicants from a sales environment present a further assessment difficulty, with some simply employing techniques no different from those used by sales personnel in a non-engineering environment. Some,

however, have in-depth technical knowledge, often calculate requirements and select equipment and are a key source of updated technical information for other engineers.

Assessment of Competence

The assessment will depend to a large extent on the employer and the division of responsibilities. For instance, in recent times, because of the primary driving force behind so many projects being financial, managing directors and high ranking staff members of building services engineering firms may originate from financial, accounting or quantity surveying backgrounds, without the technical knowledge required for full Membership.

The Chartered Engineer	The Incorporated Engineer
Competence statements A and B - Knowledge and understanding, application to practice	
<p>A successful applicant should be able to demonstrate detailed design knowledge, in the areas of building services in which they are involved, and a high level of understanding in peripheral areas. For instance, applicants who design steam installations will need to understand the characteristics of the steam load, method of control at point of use, temperature/pressure/enthalpy of the steam, pipework velocities, pipework expansion, details of trapping points etc. They may possess only limited knowledge of items such as the steam generation plant, as these are designed by specialists, but they do need to know, for example, when they should select shell-and-tube boilers in preference to steam generators and parameters to consider when choosing equipment such as boilers e.g. efficiency, evaporation surface, modulating, high-low or on-off burners, etc.</p> <p>Because very few buildings are identical there are numerous opportunities for applicants to demonstrate a creative approach and the use of advanced and emerging technologies.</p> <p>Examples of these include:</p> <ul style="list-style-type: none"> • Implementation of heat recovery techniques • Methods of reducing energy usage in buildings • Unusual methods of accommodating plant within structures • Methods of reducing initial capital expenditure • Adopting new equipment or techniques e.g. different methods of pipe jointing <p>Since no two buildings are alike, they are all effectively prototypes; and the most successful projects are those where potential difficulties are identified and solutions evaluated prior to the project being implemented on site. It follows that one of the main challenges facing the building services engineer is to find a way of communicating details of potential problems and solutions to</p>	<p>A successful applicant should be able to demonstrate a depth of expertise in a particular specialism or in a broad range of building services engineering activities. They should be able to apply recent developments in building services engineering and be able to install building services engineering systems. They should be able to apply design theory to achieve practical solutions evidenced by design documentation or technical specifications.</p> <p>Individuals should be familiar with contract procedures for a range of sites including land, sea, urban, rural, large or small buildings and even those found in extreme weather conditions. They may be required to commission, test and set to work systems and be familiar with handover procedures. This may involve preparing handover documentation, participating in meetings and/or factory acceptance test programmes.</p> <p>Individuals should understand the principles and techniques of planned maintenance through participation in short, medium or long term projects. This may be through secondment to a contractor or a different department within the company and evidenced through:</p> <ul style="list-style-type: none"> • Reports regarding the cost implications of planned maintenance and how problems may be tackled in a variety of ways; • How solutions to poor or neglected maintenance problems were identified; • Individual contribution to refurbishment decisions. <p>Understanding the different roles of professionals involved in the building services industry and how their individual roles contribute to the overall project is important, e.g. architects, surveyors, other engineering disciplines. Site problems should be handled effectively and expeditiously with the proper exchange of information.</p>

<p>others, to avoid unnecessary duplication of effort in the future.</p> <p>Individuals may also be familiar with the uses of CAD packages to draught and/or design.</p>	<p>Individuals may also be familiar with the uses of CAD packages to draught and/or design.</p>
<p align="center">Competence statement C - Leadership / Management / Supervision</p>	
<p>Because of the relatively flat management structure in many building services organisations it is possible for engineers at the same professional level to have widely different skills and experience. It is therefore essential for applicants to demonstrate their own skill levels in the fields of planning, budgeting etc. In smaller companies engineers will often fulfil a multitude of rôles and will have experience in all of the above sectors.</p> <p>In larger companies workloads may be more segregated, possibly resulting in applicants being deficient in some skill areas. On the other hand there are, again in the larger companies, senior positions allocated to purely technical activities. Their rôle is to advise all engineers throughout their company or region of their organisation on technical solutions, updated statutory requirements, areas of good practice, etc. and generally to disseminate advanced technical knowledge.</p> <p>Although line management responsibilities may be limited, they often operate within a structure of secondment (if only for relatively short periods) and in so doing take on board the line management and/or other decision-making processes of the person they are supporting. This level of line management should be balanced against the high level of technical expertise and accountability that they bring to a particular situation. Evidence of management skills may be found through involvement in projects.</p>	<p>Because of the relatively flat management structure in many building services organisations it is possible for engineers at the same professional level to have widely different skills and experience. It is therefore essential for applicants to demonstrate their own skill levels in the fields of planning, budgeting etc. In smaller companies engineers will often fulfil a multitude of rôles and will have experience in all of the above sectors.</p> <p>Individuals will normally be involved in meetings with clients, preparing tender documentation and bids on a timely basis. They will also be responsible for liaising with clients, manufacturers and suppliers and be expected to understand the differing requirements of each party.</p> <p>In some cases, individuals may be involved in evaluating tenders and awarding contracts. In these circumstances, they should be able to analyse competing tenders and produce comparative documents with recommendations to enable proper judgements to be made.</p> <p>Evidence of management skills may be found through involvement in projects or through line management or supervisory responsibilities.</p> <p>An understanding of quality assurance issues is also important and individuals may be involved in monitoring processes.</p>
<p align="center">Competence statement D - Interpersonal Skills</p>	
<p>Applicants will, during their everyday working life, prepare reports on existing installations or detailed descriptions/quotations for new systems. If an example is available, this should be examined to ensure that it has a straightforward and understandable structure and clearly outlines and goes on to establish its objective. Many people responsible for operating buildings do not have a technical background and reports tend to contain basic explanations of more complicated technical items. Additional evidence of competence in these areas may be sought by investigating whether the applicant:</p> <ul style="list-style-type: none"> • is involved in in-house presentations • routinely makes presentations to outside clients and/or contractors • is involved in contract liaison and negotiation • participates in any form of personal development, either within their own company, or on a larger basis involving personnel outside their company who may be working on the same or similar projects 	

Competence statement E - Commitment and Professional Conduct

Although, in general, building services designs are individually prepared for particular projects, most of the components e.g. boilers, air compressors, etc. are designed to British Standards which are applicable either to equipment in its entirety or to certain sections of it. In addition there are standards and codes of practice e.g. ventilation to boiler houses, which must be applied to any design. Because of the broad nature of the work the engineer needs to take responsibility for updating his own technical knowledge, which may include attendance at seminars, reading technical journals and reference to updated lists of British Standards and codes of practice. The building industry, in both construction and operation, has traditionally not been one of the safest and in 1994 safety issues were eventually re-formulated under the Construction Design and Management (CDM) Regulations. These regulations required that within any design attention had to be paid to construction methods and to any maintenance requirement once the building was put into use. This led, for example, to increased space in front of electrical panels, access platforms for equipment, etc. In addition, design engineers had to contribute to the Health and Safety plan by outlining hazards and precautions that need to be observed during the design and construction phases, and once the building comes into use. The latter are then incorporated into the Health & Safety manuals that are given to the client upon completion; these also incorporate the records, drawings and operating and maintenance instructions.

Requirements for election or transfer to Fellow

The following senior engineering posts within the Building Services Industry may be considered as generally likely to meet the requirements for the class of Fellow:

Managing Director
Partner
Director
Group Engineer/Chief Engineer
Associate Director

As with the requirements for Membership it is incumbent upon applicants to demonstrate their own technical skill and responsibility levels, as job titles cannot be taken as evidence of meeting the necessary requirements. Applicants are likely to be experts in at least one area of work within their own field, demonstrated by papers they have presented, expert witness assignments or even repeat appointments from clients.

Applicants will generally have significant additional responsibilities in the following areas and would be authorised to make decisions without reference to their superiors.

- Financial matters
- Strategic and commercial issues
- Staff levels
- Company policy formulation and implementation
- Quality Assurance implementation

Not only should they participate in the above but they should also demonstrate that they are influential in formulating the actual policies within their organisations.

For members, and more specifically fellows, CPD and how the applicant is contributing to the role of engineering in society should be mentioned. E.G. "it is important that engineers contribute to society and help to foster the image and perception of chartered engineers. This may be assistance at scholastic or academic establishments, charitable works which may offer an opportunity to demonstrate the usefulness of engineering to society or by attendance at related (but not direct engineering) seminars (healthcare, green issues). Fellows should also assist in promoting IMechE and mentoring graduates, particularly the "difficult" or unusual Mentees.