

**PLEASE NOTE THIS EXAMPLE DATES FROM THE PREVIOUS EDITION OF  
UK-SPEC AND REFERENCE SHOULD BE MADE TO THE 2014 EDITION.**

**IT IS OFFERED AS AN EXAMPLE OF FORMAT AND CONTENT ONLY.**

**Re: Incorporated Engineer – Professional Engineering Competence Standards  
for**

Dear Sir / Madam;

Please find on the following pages my completed Engineering Practice report required as part of my application to become an Incorporated Engineer.

Thank you,

## Incorporated Engineer – Professional Engineering Competence Standards

Italics represent EC(UK) Generic Standard, other fonts represents IHEEM's interpretation of competence statements

	EC(UK) Generic Standards	IHEEM's Healthcare Standards
<b>A</b>	<b><i>Use a combination of general and specialist engineering knowledge and understanding to apply existing and emerging technology.</i></b>	<b>Use a combination of general and specialist engineering knowledge and understanding to apply existing and emerging technology in the fields of Specialist Medical Healthcare Equipment/Engineering Services, Building Services engineering design, installation and maintenance - Heating, Hot and Cold Water, Ventilation and Air Conditioning.</b>
<b>A1</b>	<i>Maintain and extend a sound theoretical approach to the application of technology in engineering practice.</i>	<p>A. At Gwinnett Medical Centre – Energy Plant , Installed an additional 750 KW , 277/480 Volt , 1100 Amp, Emergency Power Generator Set manufactured by Cummins Co. in order to meet additional electrical loads requiring emergency power in the hospital. My scope of work included :</p> <ul style="list-style-type: none"> <li>• Sizing existing emergency power distribution loads and future loads ,(including 25% reserve capacity) in order to determine generator size.</li> <li>• Design drawings and specifications ( working with Electrical Engineer).</li> <li>• Product selection and procurement (Equipment Purchased directly by hospital from distributor. including document submittal review.</li> <li>• Coordinated installation of new generator and associated transfer switch, by overseeing electrical contractor perform work.</li> <li>• Commissioned and tested generator installation in order meet NFPA and JCAHO requirements.</li> </ul> <p>B. At St. Josephs Hospital installed new Fluoroscopy Equipment(Picker Mfr.)to replace existing equipment. My scope of work included:</p> <ul style="list-style-type: none"> <li>• Understanding the space, utility and environmental needs for the new equipment and established the new requirements.</li> <li>• Technical scope of work included a new 800 amp /480 volt /3 phase service; Replacing existing HVAC air handler coil and ductwork to meet additional cooling requirements (approx 5 more tons needed): Relocating pipe medical gases, lighting and plumbing in the equipment room.</li> <li>• Worked with Architect and Equipment Manufacturer to provide construction documents for in-house electricians, carpenters, painters,</li> </ul>

		<p>plumbers and HVAC tech. to work with.</p> <ul style="list-style-type: none"> <li>• Oversaw the daily installation work, coordinating utility tie-ins, and making sure the customers needs are being met i.e. the radiology department manager.</li> <li>• Provided commissioning of HVAC, Medical Gas and Electrical System.</li> </ul>
A2	<i>Use a sound evidence-based approach to problem solving and contribute to continuous improvement.</i>	<p>Two examples of personal involvement with projects requiring problem solving are as follows:</p> <ol style="list-style-type: none"> <li>1. Lack of proper patient care environment for housing patients with infectious diseases. i.e. Tb. The existing Emergency Room at Gwinnet Medical Centre had no rooms suitable for housing patients with infectious diseases, in particular Tb – resulting in ER patients having to be rerouted to other hospitals. The solution to this problem was to modify the existing HVAC exhaust /return air system in the E R to create 4 negative air pressure patient treatment rooms with a minimum of 6 air exchanges per hour each. (These were the code requirements as written in the American Institute Architect Guidelines Requirement for Hospitals/ State Health dept.). Included in the scope of work apart from ductwork modifications was the installation of a dedicated Exhaust Fan on the roof of the ER. Continuous Improvement /Quality Assurance was obtained by; <ul style="list-style-type: none"> <li>• Each room was provided with an LED pressure monitor outside the room that monitored the room pressure. This monitor was alarmed locally.</li> <li>• Nursing and the Infection Control dept. developed a policy &amp; procedure that required daily recording of room pressure when the room was occupied by patients requiring isolation.</li> <li>• An airflow switch was installed in the exhaust ductwork on the fan inlet side, used for monitoring airflow. In event of no airflow the switch would send a signal to the Johnson Controls Building Mgt System to alert the engineering staff of a problem.</li> <li>• A Preventive Maintenance work order was placed in the Computerized Maintenance Management Program to have an engineering technician take airflow readings every 90 days to measure for air exchange rate compliance.</li> </ul> </li> </ol>

		<p>2. Inadequate Medical Air supply to Neonatal Nursery, Gwinnet Medical Centre. The medical air plant for this part of the hospital comprised of a Triplex Medical Air System – which included 3 x 10 HP Rotary Oil Less compressors, operating in lead/lag, with one compressor in reserve. Operating pressure of 50 psi delivering 69 cfm. Manufactured by Ohmeda (now BeaconMedaeus) <u>Continual “reserve-in-use” alarm, started to go off every day over several days.</u></p> <p>The initial engineering dept response comprised of checking the functionality of the alarm itself along with determining the operational load on the system compared to the patient demand. It was discovered that all 3 compressors were in use – and operating at full capacity. The patient census for this area though was consistent with previous months.</p> <p>An investigation made by myself discovered that the Respiratory Dept had changed Nebuliser products and had just started to use a high output Nebuliser requiring more cfm of medical air. The NFPA 99 Health Care Facilities Code requires that there be redundancy to support the calculated load in the event of any one of the compressors failing (in this case one out of three), hence we were using up our redundancy and violating the code.</p> <p>Two part solution:</p> <p>Firstly I met with the Respiratory Dept Director to establish what each high output Nebuliser required based on specifications provided and then advised the Respiratory Director of what our medical air system could provide at any one time without violating NFPA 99. This impacted the Nurseries ability to care for the same amount of patients by having a maximum capacity restriction.</p> <p>Secondly, we purchased and installed a fourth compressor to increase existing capacity and installed a sixplex base that allowed for an additional two compressors in the future should the need arise.</p> <p>Continuous improvement was obtained by the Respiratory Dept. writing out policies &amp; procedures for the nursing staff to follow re: the amount of high output nebulisers they could use at any one time and the clinical alternatives.</p> <p>In addition the hospital clarified its equipment purchasing policy to include Engineering as part of the review and approval process so as to ensure that any impact cost on a utility i.e new electrical service ,additional medical gas equipment would be factored in at the beginning.</p>
--	--	---

<b>B</b>	<b><i>Apply appropriate theoretical and practical methods to design, develop, manufacture, construct commission, operate and maintain engineering products, processes, systems and services.</i></b>	<p><b>Apply appropriate theoretical and practical methods to design, develop, manufacture, construct commission, operate and maintain engineering products, processes, systems and services.</b></p> <p><b>Give examples of the application of these competencies within one of the fields of Specialist Medical Healthcare Equipment/Engineering Services, Building Services engineering design, installation and maintenance - Heating, Hot and Cold Water, Ventilation and Air Conditioning.</b></p>
<b>B1</b>	<i>Identify, review and select techniques, procedures and methods to undertake engineering tasks.</i>	<p>Working at St. Josephs Hospital brought direct involvement with overseeing the construction of an additional operating room. This was a 650 sq.ft Operating Room to be used for Orthopaedic Surgery with an additional 500 sq.ft of support space. that required the following engineering tasks necessary to bring the project to conclusion:</p> <ul style="list-style-type: none"> <li>• Witnessed testing of the newly installed systems to ensure compliance with all regulatory standards i.e. Fire Alarm; Sprinkler; Medical Gas; HVAC; Nurse Call; Electrical Power and Hot Water.</li> <li>• Received from General Contractor the Operating &amp; Maintenance Manuals for all new equipment and systems installed, including written certifications of the testing performed.</li> <li>• Received from General Contractor via Architect "As Built" engineering drawings for the new area.</li> <li>• Performed walk through punch list of the newly constructed area with Architect, General Contractor and Hospital OR staff to ensure that the construction workmanship is satisfactory and that the intent of the design has been met.</li> <li>• Monitor completion of any punch list deficiencies.</li> <li>• Walk through with State Fire Marshall and City Building Inspector for the approval of a Certificate of Occupancy.</li> <li>• Place new equipment and systems in the engineering dept computerized preventive maintenance program.</li> </ul>

B2	<i>Contribute to the design and development of engineering solutions</i>	<p>As a Technical Support Manager, developed an Energy Savings Program using Microsoft Excel, for all Sodexho site based Hospital Engineers to use. This became copyrighted material.</p> <p>This program was based on the on-site engineer collecting data and measuring existing operational practices and conditions of the physical plant and inserting the collected data into a series of tables in the Excel workbook. The workbook would automatically calculate resulting energy savings. The workbook comprised of the following categories;</p> <ul style="list-style-type: none"> <li>• Equipment Condition</li> <li>• Belts &amp; Motors</li> <li>• Piping Insulation</li> <li>• Lighting</li> <li>• Chiller Operation</li> <li>• Boiler Operation</li> <li>• System Leaks</li> <li>• Equipment Shutdown</li> <li>• Steam Traps</li> <li>• Heating &amp; Cooling System</li> </ul> <p>The end in mind was to save or avoid approximately 3 to 5 % of a given years energy cost.</p>
B3	<i>Implement design solutions and contribute to their evaluation</i>	<p>Gwinnet Medical Centre – “ Pancake building addition to main hospital building” The project added 100,000 sq,ft to an existing 300,000 sq,ft building, The energy plant needed an additional 500 ton centrifugal chiller to provide adequate cooling to the new total 400,000 sq,ft structure ,including new primary chilled water and condenser pumps. This also provided a solution for an existing chiller redundancy issue.</p> <p>The complete chilled water loop required balancing in order to commission the system with the additional chiller and pumps as well as the additional Air Handling equipment in the 100.000 sq,ft addition. The commissioning process was conducted as follows:</p> <ul style="list-style-type: none"> <li>• Prior to design of the 100,00 sq,ft structure ,using a certified test &amp; balance company, existing chilled water flow rates in GPM were taken at the existing primary and secondary chilled water pumps and at the coil in each of the existing air handlers.</li> <li>• The measurements were compared against the original design specifications and the test &amp; balance company adjusted the balance valves settings</li> </ul>

		<p>throughout to the original settings where required.</p> <ul style="list-style-type: none"> <li>• Those areas served by the reset chilled water balance valves were found to be victims of increased heat load i.e. Laboratory and Pharmacy Air Handlers.</li> <li>• In the new addition design , the design engineer factored in additional chilled water GPM along with coil and piping increases for those 2 Air Handlers that served the Lab and Pharmacy.</li> <li>• Design engineer provided HVAC design for new building, including the chiller and pumps previously mentioned as well as 7 new Air Handlers that ranged up to 20,000 cfm in capacity. The 7 new air handlers were looped in with the existing 16 from a chilled water perspective.</li> <li>• Upon completion of installation of new equipment, using the new design specifications for the whole building chilled water system <u>and</u> the building automation system (Johnson Controls Metasys) sequence of operation specification, the test &amp; balance company supported by the control systems technician , set forth to balance the system.</li> <li>• Any part of the system that could not be balanced by adjusting the balancing valve to obtain a variance within 10% of design ,was noted on the test &amp; balance report.</li> <li>• Test &amp; balance report submitted to design engineer and myself for review to ensure operation of chilled water system relative to design.</li> <li>• The newly installed primary chilled water pump was found to be inadequately sized when 90% of the Air Handlers were calling for cooling with the 3 way chilled water modulating valve 100 % open, there was not enough GPM flow. The short term fix was to run the chilled water standby pump that was connected in parallel to the main pump.</li> <li>• The pump sizing was recalculated and at the design engineers expense resulting in new larger pumps being installed about a year later as part of another building expansion.</li> </ul>
<b>C</b>	<b><i>Provide Technical and commercial management</i></b>	<b>Show details of positions held in an organisation demonstrating technical and commercial management</b>
<b>C1</b>	<b><i>Plan for effective project implementation</i></b>	<p>Gwinnet Medical Centre – Patient Room Refurbishing Project.</p> <p>Scope of work: To refurbish twenty - single patient rooms including new ceilings, floor and wall covering; new cabinetry ;new lighting, new bathroom plumbing and fixtures ,new electrical outlets; new headboard; refinish room door.</p>

		<p>This was part of a 5 year project ,doing 20 rooms a year due to budget restraints , 100 in total in the older part of the hospital.</p> <p>Once costs were approved and work team established the implementation plan to start the work consisted of:</p> <ol style="list-style-type: none"> <li>1. Met with hospital administration and nursing administration to determine which rooms ( a stack of 5 due to plumbing riser needs)</li> <li>2. Solicit proposals from contractors to perform the work based on scope.</li> <li>3. Determine project timeline for the 20 rooms based on material lead time.</li> <li>4. Submit dates for work to commence to Nursing, in order to keep rooms free</li> <li>5. Job kick off meeting with contractor re; logistics ,safety and communication protocols, then work can commence.</li> </ol>
C2	<i>Manage the planning, budgeting and organisation of tasks, people and resources.</i>	<p>The project is the Gwinnet Medical Centre Women's Pavilion, 12,000 sq.ft addition for additional Labor &amp; Delivery rooms, High Risk Pregnancy unit and a new Nursery. The following is a broad overview of the process/stages that I was involved with as it relates to project implementation, cost control and project timing.</p> <ol style="list-style-type: none"> <li>1. Space &amp; functional planning</li> <li>2. Costing budget estimate and board approval</li> <li>3. Architectural review and design</li> <li>4. Construction documents /bid specifications</li> <li>5. Bid results</li> <li>6. Value engineer , compare against budget, select add/delete alternates to scope</li> <li>7. Finalize scope and contract price and award work to a General Contractor</li> <li>8. Determine detail schedule with Gantt chart /milestones</li> <li>9. Project commencement</li> <li>10. Weekly project site meetings: <ul style="list-style-type: none"> <li>• To review the schedule and coordination needs i.e. utility tie-ins</li> <li>• To review any change order requests – accept or deny</li> <li>• To review project budget and compare actual to budget costs</li> <li>• To review contractor payment schedule</li> <li>• To answer technical design issues brought forward from the trades</li> <li>• To inspect job site progress with a "hard hat inspection"</li> <li>• To review document submittals on product/equipment/material specs</li> </ul> </li> <li>11. Receive meeting minutes of site meetings. Issues documented and brought forward to next site meeting, if not able to correct prior.</li> </ol>



C3	<i>Manage teams and develop staff to meet changing technical and managerial needs.</i>	I was responsible to develop engineering staff when it pertained to new equipment that was installed and arranging training for staff were responsible to operate and maintain the equipment . My technique used was on-site in-servicing performed by the manufactures representative. I would provide my expectations to the rep. and level of learning to be achieved , arrange for a classroom with visual aids, followed by a hands –on session in the plant. This site training would be provided by the rep., advanced training for the higher skilled person with more responsibility would be offsite at the manufacturers training facility/factory. Costs would have to be budgeted for in the department operating budget. The on-site training would be video taped for future use as needed i.e. new employees.
D	<b><i>Demonstrate effective interpersonal skills</i></b>	<b>Your commitment will be to become part of the engineering profession and uphold standards to which all members subscribe. You need to show that you have read and understand IHEEM's Code of conduct</b>
D1	<i>Communicate in English with others at all levels.</i>	<p>I have written :</p> <ul style="list-style-type: none"> <li>• Department Operational reports for my superiors.</li> <li>• Financial reports relative to budget variances and purchased service contract analysis.</li> <li>• Performance appraisals for my subordinates.</li> <li>• Safety Committee reports/meeting minutes.</li> <li>• Department Policies &amp; Procedures.</li> <li>• Department meeting reports.</li> <li>• Site reports following my support visits to hospitals.</li> <li>• Letters to contractors , companies, vendors and professional organizations.</li> <li>• Project meeting minutes</li> <li>• E Mail to my fellow department managers on daily needs and issues.</li> <li>• Regulatory Compliance audit reports</li> </ul> <p>Verbal communication has been achieved in the following manner:</p> <ul style="list-style-type: none"> <li>• Chairperson of the Safety Committee at Rockdale, Oneida and Parkway hospitals.</li> <li>• Daily discussion with department staff relative to work delegation and other related issues.</li> <li>• Project work communication with contractors.</li> </ul>

		<ul style="list-style-type: none"> <li>• Telephone calls to peers, supervisors and subordinates.</li> <li>• Shop meetings.</li> <li>• Staff training on Safety topics and department administrative items.</li> <li>• 2 years as Chairperson of the Central New York Hospital Engineers Society.</li> <li>• Daily discussion with supervisor and hospital executives</li> <li>• Have conducted Power Point presentations on Regulatory Compliance to Sodexho Managers at District meetings</li> </ul>
D2	<i>Present and discuss proposals.</i>	<p>A typical working experience relating to HVAC Service Equipment Service bid proposals at Gwinnet Medical Centre has resulted in the delivery of a written report in ring binder format ,tabulated by the following sections;</p> <ul style="list-style-type: none"> <li>• Overview</li> <li>• Objective and Scope</li> <li>• Bid Results</li> <li>• Analysis including cost benefit</li> <li>• Summary and recommendations</li> </ul> <p>The audience comprised of the Chief Operating Officer, VP of Operations and the Materials Manager/Service Line Director. Each was given a copy of the report to read from ,whilst presenting the proposal.</p>
D3	<i>Demonstrate personal and social Skills.</i>	<p>18 years experience as a healthcare facilities manager has allowed me to serve and meet the needs of others as it relates to the safety and care of patients ,employees and visitors. The personal and social skills resulting from meeting those needs have been:</p> <ul style="list-style-type: none"> <li>• The management of my own emotions ,strengths and weaknesses by participating in an enriched Sodexho/ Client job performance appraisal process that comprises of the "180 approach" i.e. self evaluation/supervisor evaluation resulting in an Individual Development Action Plan that has led to participation in such things as Customer Service Training programs; Clients for Life program; Diversity training.</li> <li>• Listening to customer complaints , being supportive of the customers needs and following up to ensure satisfaction.</li> <li>• Confidence in multiple assignments ( 6 hospitals in 18 years) working</li> </ul>

		<p>with the change and adapting successfully in different organizational structures with different cultures.</p> <ul style="list-style-type: none"> <li>• Developing goals for the department based on the hospital mission and objectives, the Sodexo mission and objectives. Measuring the goals through performance and ensuring buy-in from subordinates to achieve the goals. Discuss goals at shop meetings with staff for feedback and input.</li> <li>• Participation in Client Expectation meetings to understand the needs of the client from the Sodexo perspective.</li> <li>• Resolving conflict between a dept supervisor and employee ; between a customer/ the dept.</li> <li>• Practicing the Stephen Covey principles through reading the book and participating in the course "Seven Habits for highly Effective People" .</li> </ul>
<b>E</b>	<b><i>Demonstrate a personal commitment to professional standards, recognising obligations to society, the profession and the environment</i></b>	<b>Your commitment will be to become part of the engineering profession and uphold standards to which all members subscribe. You need to show that you have read and understand IHEEM's Code of conduct</b>
<b>E1</b>	<b><i>Comply with relevant codes of conduct.</i></b>	<p>Practiced and mandated to adhere to in all positions of employment the following codes of conduct;</p> <ul style="list-style-type: none"> <li>• Sodexo Business Conduct Guide.</li> <li>• American Society of Healthcare Engineering – Certified Facility Manager conduct guide.</li> <li>• The Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule.</li> </ul> <p>The three codes of conduct referenced above are supplemented by business practices based on the requirements outlined in the following codes and standards that pertain to maintaining the Life Health and Safety of all patients , employees and visitors in US hospitals.</p> <ul style="list-style-type: none"> <li>• Joint Commission on Accreditation of Healthcare Organizations (JCAHO).</li> <li>• National Fire Protection Association (NFPA).</li> <li>• Guidelines for Design and Construction of Hospital &amp; Health Care Facilities , by the American Institute of Architects.</li> <li>• Occupational Health &amp; Safety Administration ( OSHA – Federal Government)</li> <li>• State Building Code and State Fire Code.</li> </ul>
<b>E2</b>	<b><i>Manage and apply safe systems of work.</i></b>	My personal experience of managing and Health and Safety issues are based upon the standards and expectations outlined in the above codes in E1. Examples are;

		<ul style="list-style-type: none"> <li>• Safety Inspections (JCAHO Environment of Care Hazard Surveillance) of the facility and grounds –with written findings and follow –up.</li> <li>• Safety Officer/Chairperson of the Hospital Safety Committee. Meet and discuss health and safety issues with an interdisciplinary group of representatives from within the hospital. Provide leadership and direction on the hospital safety program ensuring compliance with JCAHO and OSHA.</li> <li>• Performed Fire Safety audits , known as the JCAHO Statement of Conditions (SOC) is to ensure compliance with NFPA 101 Life Safety Code and required for a hospital to receive its triennial accreditation from JCAHO.</li> <li>• Self Audit using checklist tools to ensure continual compliance for JCAHO, OSHA and other regulatory agencies, Make plans of corrections and ensure completion of such.</li> <li>• Escort JCAHO surveyors/ OSHA inspectors/ State fire marshals during their on-site visit to hospital. Discuss, interact and understand any found safety issues.</li> <li>• Participate as member in the hospital Infection Control committee. Provide technical information relative to environmental systems and possible infection control issues. Perform actions required by committee resolutions.</li> <li>• Administer Engineering Department preventive maintenance programs relative to testing Fire Safety equipment ,Critical Utilities equipment.</li> <li>• Administer Engineering Department programs such as Interim Life Safety Measures, Fire /Smoke Barrier penetration permit, Infection Control Risk Assessment , Hazard Vulnerability Analysis.</li> <li>• Administer Engineering Department Safety training for all department employees.</li> </ul>
E3	<i>Undertake engineering activities in a way that contributes to sustainable development.</i>	<p>Whilst working at Oneida City Hospital worked on the following projects;</p> <ol style="list-style-type: none"> <li>1. Energy Conservation . This was a New York State Energy grant project , which was a 50% matching grant to fund the capital cost of the project ,based on state monies received from the Exxon Oil company. A 3<sup>rd</sup> party energy audit was performed to establish any demand side energy saving opportunities with a 2 to 10 year payback. As a result of the audit two energy saving measures were selected; <ul style="list-style-type: none"> <li>• Replace all existing 40w fluorescent lamps with the 32w T8 fixture with electronic ballast.</li> <li>• Install Volume Air Dampers on the main HVAC supply branch lines .</li> </ul> </li> </ol>

		<p>These were pneumatically activated by the building control to reduce demand on the air supply costs in certain areas of the hospital.</p> <ul style="list-style-type: none"> <li>• Replace inefficient electric motors with more efficient ones.</li> </ul> <p>My responsibility was to solicit proposals for the work to be done, coordinate the work and report back to NY state the measured energy savings in terms of units and cost.</p> <p>2. Medical Waste. Versus paying the cost to have regulated medical waste shipped out for incineration to another State, performed a simple cost analysis to convince the hospital to purchase and install an autoclave and shredder, thereby allowing the waste to be considered regular waste and sent to a nearby landfill. Cost savings were passed back to the hospital. This process required approvals from New York State Department of Health and the County Landfill Authority.</p>
E4	<i>Carry out continuous professional development necessary to maintain and enhance competence in own area of practice.</i>	<p>Professional development practices have been continued as follows:</p> <ul style="list-style-type: none"> <li>• Attending the Annual ASHE Conference and Technical Exhibition for the past 3 years.</li> <li>• Attending at least one 2 day ASHE seminar/workshop in the past 3 years</li> <li>• Attending Sodexho regional peer conferences ( 2 days) past 3 years.</li> <li>• Participating in 5 Sodexho Facilities Web casts ( 1 hr each) this past year.</li> <li>• Subscription to the JCAHO Environment of Care News monthly magazine.</li> <li>• Subscription to the Engineered Systems bi-monthly magazine</li> <li>• Participation in one Sodexho leadership program each of the past 3 years.</li> </ul>