Grade-Evaluation Guide for Hospital Engineer, GS-0800

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INTRODUCTION

This guide is for use in determining grades of professional engineering positions that are involved primarily in managing a hospital engineering program. Typically, work specifically included under the coverage of this guide consists of:

(a) Professional engineering work in several disciplines such as civil engineering, electrical engineering, mechanical engineering, biomedical engineering, environmental engineering and safety engineering;

(b) Managing a hospital engineering program which includes professional engineering review and direction of assigned professional and technical programs; and

(c) Management support and assistance in developing hospital-wide policy, procedures and resource allocations, especially in professional engineering matters.

This classification guide has been developed for positions in a single Federal agency. Positions in other agencies may *not* be classified with this guide without approval of the Office of Personnel Management. This guide may be used, however, for making cross-series comparisons guided by sound position classification judgment.

BACKGROUND INFORMATION

Historically, the hospital engineering function has been primarily concerned with the technical operation and maintenance of the physical plant. Since 1968, considerable protection legislation has been enacted which has changed national objectives and operating standards relative to health care. Advances in medical technology and treatment modalities have transformed a previously static hospital environment to a dynamic operation requiring constant physical alterations and concomitant shifting of priorities and resources. Several accrediting bodies are involved with engineering issues concerning quality of patient care (e.g., fire safety, biomedical engineering, emergency support functions, and the like). These changes have required, on a functional basis, the presence of professional engineering guidance and direction in several areas of hospital operations.

RELATIONSHIP TO OTHER PUBLISHED STANDARDS AND GUIDES

This Guide supplements published classification standards for specific engineering series (e.g., Mechanical Engineering Series, GS-0830; Biomedical Engineering Series, GS-0858) and the General Grade Evaluation Guide for Nonsupervisory-Professional Engineering Positions, GS-0800. It supersedes the grade-level criteria in the individual standards for positions concerned with managing a hospital engineering program. Those positions that are entirely or primarily oriented toward hospital engineering and managing a hospital engineering program

should be evaluated by this guide. Grade-level criteria in the individual standards will still apply to positions in which the engineers spend a preponderance of their time in engineering work not covered by this guide. Positions that are engaged in engineering functions, other than those covered by this guide should be evaluated by criteria in the individual standards or other published guides.

Supervisory positions that meet fully the "minimum level of supervisory responsibility" as defined in the General Schedule Supervisory Guide should be evaluated by application of the criteria provided in that guide.

Please note that most chief engineer positions perform the full range of professional and managerial responsibilities within a work environment at least as complex as the lowest level described in the evaluation plan. It is rare, therefore, to find positions at the full performance level below GS-12. Positions below GS-12 are usually trainee or engineering support positions which are more properly evaluated directly by use of appropriate professional engineering standards.

EXCLUSIONS

Excluded from the coverage of the grade-level criteria in the guides are the following categories of positions:

1. Positions primarily concerned with the technical operation and maintenance programs that do not have as the primary requirement professional engineering qualifications. Such positions should be classified in the Facility Operations Services Series, GS-1640, or other appropriate series.

2. Positions primarily involved in the supervision or performance of work for which the paramount requirements are skill and knowledge in one or more recognized trades or crafts rather than ability to manage a comprehensive hospital engineering program. Such positions should be evaluated under the Federal Wage System.

3. Professional engineering positions that function in hospitals but do not perform the full range or substantially full range of managerial, professional and technical responsibilities described in this standard. Such positions should be classified under the grade level criteria in the appropriate engineering series.

4. Positions involving hospital engineering but not requiring full professional engineering knowledge and competence. (See the Introduction to the Engineering and Architectural Group, GS-0800, for a detailed discussion of the distinction between professional engineering positions and engineering technician positions.)

DETERMINATION OF CLASSIFICATION SERIES

Positions covered by this grade-level guide will continue to be classified to the appropriate established classification series in accordance with the definitions published in the Office of Personnel management's Handbook of Occupational Groups and Families, and the amplifying material in published position classification standards. Most positions require extensive knowledge of a broad spectrum of engineering disciplines rather than intensive knowledge of one or more engineering disciplines. Such positions are typically classified to be General Engineering Series, GS-0801.

TITLES

Titles to be used for positions classified under this Guide are the appropriate titles approved for the occupational series to which the positions are classified. An acceptable practice for activities/administrations is the use of an organizational title, for purposes of internal operation or public contact. The recommended organizational title is "Chief Engineer" and may be used whenever it is deemed appropriate. This organizational title is not to be used as an official classification title.

OCCUPATIONAL INFORMATION

In positions that are covered by this Guide, the chief engineer has broad based professional engineering and highly interrelated managerial responsibilities. Successful execution of these responsibilities has major impact upon the outcome of patient care delivery at the hospital.

The chief engineer is responsible for most if not all professional engineering matters at the hospital. The chief engineer receives administrative direction with assignments in terms of broadly defined missions or functions. The chief engineer is usually expert in at least one of the required engineering disciplines and competent in most of the others (e.g., civil engineering, mechanical engineering, biomedical engineering, environmental engineering, and safety engineering). Using a professional engineering staff and/or consultants to supplement the chief engineer's skills, a complete professional engineering service is provided to meet the needs and requirements of the medical and administrative staff of the hospital in the assigned areas of responsibilities.

Chief engineers are typically responsible for development and implementation of the hospital's capital improvement program. The chief engineer usually works with the medical activities to identify additional space needs and needed renovations to existing spaces. Identified needs are individually transformed to engineering requirements estimated, accomplished locally, or included as part of a comprehensive plan for agency funding. Examples include addition of intensive care units, modernization of surgical suites, and additions of ambulatory care wings.

The chief engineer periodically reviews major utility systems and associated equipment to assure compliance with regulations, operating standards, and ability to meet medical needs. Identified deficiencies are corrected locally or included as part of a comprehensive plan for agency funding. Examples include boiler plant replacement, addition of air conditioning, and elevator modernizations. The medical space and physical plant needs must be considered individually, assigned relative weight, prioritized, and submitted as a coordinated five-year plan to the agency for funding. The chief engineer typically develops this plan with only broad guidance from top hospital management and must consider the sequential timing of construction to minimize disruption of essential services and inconvenience to patients and staff.

Most if not all funded projects are designed by the chief engineer, the chief engineer's staff or by a consultant. In any case the chief engineer is usually responsible for the adequacy of the design. Several design parameters that often conflict with each other must be considered, evaluated, and prioritized. For example, in an intensive care unit design, these parameters would include: functional space requirements (e.g., patient flow, work flow, lines of sight, patient isolation, etc.), smoke control, air conditioning and humidity control, life support systems (e.g., air, oxygen, vacuum, emergency power, etc.), electrical safety, energy conservation, and budgetary constraints.

The chief engineer normally supervises the construction and inspects completed work for professional adequacy. Work must comply with Federal and agency requirements or, in their absence, good engineering practice.

The expanded use of high technology in medical equipment and the associated increased liability have required the development of a biomedical engineering function. The chief engineer is often responsible for providing assistance to the medical staff in selection and utilization of medical equipment. Medical equipment must be certified as to its dependability, safety, and efficacy. Medical equipment is designed, modified, and/or adapted to meet special medical needs.

The chief engineer typically provides a professional engineering consultative service to medical and administrative personnel within the hospital. Such services include feasibility studies, advice on application of new technology, and engineering solutions to identified problems. For example, the chief engineer may study the patient flow in the ambulatory care area of the hospital to increase the number of patients seen by the medical staff in a unit of time. The study also could include recommendations to decrease the time necessary to process patient blood gases in the coronary care unit (e.g., purchase of a more automated instrument, construction of a satellite laboratory, or complete renovation of the coronary care unit itself), or performance of a study to determine the feasibility of co-generating electricity to conserve energy. Such studies often cross engineering and medical disciplines requiring close collaboration, extensive coordination, and use of engineering economics.

The chief engineer is usually responsible for providing professional engineering direction to comply with legislative and accrediting requirements at the hospital. These requirements include Federal (e.g., Occupational Safety and Health Administration, Environmental Protection Agency, Food and Drug Administration, etc.), State and local authorities having specific jurisdiction concerning protection and quality of life and environment, as well as accrediting

bodies (e.g., Joint Commission on accreditation of Hospitals, College of American Pathologists, etc.). The chief engineer develops policies and procedures, usually without further professional review, that comply with these frequently conflicting requirements, while minimizing adverse impact to patient care.

The chief engineer provides engineering review and guidance of assigned technical programs. The programs typically include maintenance of structures, grounds, and associated equipment and operations of heating and air conditioning plants, water and sewerage treatment plants. These programs are systematically reviewed to assure compliance with published guidelines and good engineering practice. Deficiencies identified must be corrected or programmed for funding.

Changing national initiatives often require the chief engineer to adjust the manner in which all the previously discussed services are provided. Such initiatives as energy conservation, architectural barriers, disposal of hazardous wastes, and the like create a fluid professional environment for the chief engineer. Approaches to new and existing systems, policies, and programs must be changed to ensure compliance with these initiatives.

Chief engineers are key managerial advisors reporting directly to top hospital management. They are responsible members of the hospital top management team and are relied on for authoritative ad vice on most if not all aspects of engineering matters. They are fully participating technical advisors in all or almost all significant management planning, policy, and decision making actions of the medical center except those of a primarily medical nature.

The chief engineer actively participates in formal and informal management sessions, including policy review and advisory boards or committees whose functions are not limited to engineering concerns. This broad advisory role involves direct participation (although in a staff advisory capacity) in all major aspects of the overall general management of the medical center, including active participation in the making of management decisions that are related to general policy-setting matters and long-range program planning. Chief engineers play a major role in the allocation of hospital resources as evidenced by their chairing or participating in the major hospital management committees such as budget, position management, equipment, space, and accreditation.

Chief engineers have full administrative and managerial responsibility for the hospital engineering program carried out by the Engineering Service. They are fully responsible for planning, organizing, staffing, directing, controlling, and evaluating the program at their specific hospitals. Chief engineers coordinate their activities with other administrative and medical departments in the hospital.

They initiate, shape and set policy, procedures, standards and goals in their organization; develop and apply an internal program of management review, appraisal and improvement; establish priorities in light of budget and manpower constraints; and provide for formal and on-the-job training and instruction for their staffs. Chief engineers formulate, implement, coordinate, and control comprehensive facility improvement programs. They respond to the myriad needs of the health care environment and have the authority to effect changes for the

benefit of patients, staff, and visitors. The chief engineer is responsible for assuring the continuous operation of essential patient services and rapid response to conditions which man interfere with such services.

EVALUATION PLAN

This evaluation plan provides for the classification of chief engineer positions in grade GS-12. Positions are to be evaluated in terms of two factors and assigned to grade levels by use of the conversion table on the last page. The two evaluation factors are Factor 1, Level of Professional Engineering Responsibility and Factor 2, Complexity of Operating situation. The material under these two factors is described in terms of typical characteristics and the levels are expressed in terms of relative degrees.

EVALUATION NOTES

A degree specifies the particular combination of basic professional, hospital, or program characteristics which typify the different levels of chief engineer positions. Each degree is based on the presence of the full range of characteristics described. When a position fails to meet fully the characteristics established for a given degree, it must be rated a degree below unless there is a showing of other combinations of compensating features.

The hospital or program may have certain characterics not specifically included in the descriptions but which may impact on the engineering operation, significantly enough to be taken into account in determining the proper degree to assign. It is emphasized that the presence or absence of additional strengthening features does not necessarily affect the assignment of a degree. To warrant consideration, the impact of these features must be such as to magnify significantly the scope, complexity, and variety of the work of the chief engineer's position. It must be demonstrated that the additional feature(s) appreciably affects the scope of the engineering operation and requires substantial engineering programming specifically to accommodate it.

Further, to warrant evaluation consideration for a particular degree, the additional feature must be additive and not already implicit in the basic characteristics set forth in the descriptions. An additional feature may be considered to strengthen only one of the factors (either the professional engineering aspects or the managerial aspects). In other words, it cannot be credited more than once.

Consideration of additional features may be helpful in answering questions about positions having mixed degree characteristics or those which operate in a hospital whose basic characteristics fall between the degrees shown. The presence of additional features may, in some situations, so substantially increase the level of difficulty and responsibility of some chief engineer positions that assignment to the next higher degree may be warranted. This may occur when the work requires substantial additional engineering program planning and operations to accommodate the additional features and the extent of this responsibility is such that, when

combined with the basic characteristics of the position, the level of difficulty and responsibility of the total position is clearly equivalent to that described for the next higher degree.

In making degree assignments in these atypical situations, good classification judgment must be used. Before assessing additional professional, hospital, or program characteristics on the position, the relative strength or weakness of the basic characteristics should be taken into account and balanced before the decision is made to credit the next higher degree.

For example, if Element I under Factor I falls between degrees, major construction activities, such as research wing additions, building replacement, and replacement hospitals, under the jurisdiction of an agency level resident engineer should be reviewed. While these projects reduce the direct project workload of the chief engineer, they may create other problems which must be considered. The chief engineer typically must coordinate shut downs, relocate activities dislodged by this construction, plan for activation, and evaluate and alter the construction after activation.

An example for Factor II for positions that fall between degrees could be the number of outpatient visits in a year because a large outpatient case load typically creates extra demands on space and equipment. As the outpatient load increases, the chief engineer must review this function more frequently to assure that existing facilities are adequate and adverse impact to support services such as radiology, laboratory, nuclear medicine, etc., are minimized. The chief engineer frequently identifies long term solutions to top hospital management when indicated and implements interim solutions within the engineer's own resources. Outpatient visits between 50,000-125,000 typically characterize Degree B hospitals, while outpatient visits exceeding 175,000 typically characterize Degree A hospitals.

Other characteristics that could be considered include but are not limited to engineering support to physically remote clinics and cemeteries, support of a domiciliary program, remoteness of a hospital from population centers; frequently serving as a pilot hospital for new programs initiated at the agency level, and hospitals exceeding 100 years of age. The presence of each characteristic or their combination can only be credited if their impact upon the position can be demonstrated.

The additional features may only be considered when assigning degrees to the two factors. The final grade level decision must be that grade which results from direct application of the table on the last page of the guide. The additional features may not be used to change the grade at that point in the evaluation process.

Dollar values represented by maintenance, repair, renovation, modernization, and new construction projects; the engineering organization's recurring budget; and the acquisition value of medical equipment are used as measures of complexity. Obviously, increases or decreases in fund allocations attributable to economic fluctuations distort the intent of the guide if these criteria are applied with no adjustment to take the effects of these fluctuations into account. For example, increase in dollar volume that does not denote an actual increase in activity, complexity, or responsibility should not be used to assign a higher degree level. Accurate year-to-year comparisons of dollar totals for those items must be made in terms of current established

price indexes in order to compensate for economic fluctuations. The illustrative material included in the guide reflects current assignments, functions, and methodology in the engineering and managerial fields. Since these are dynamic fields, this reliance on contemporary illustrative material presupposes, to a greater or lesser extent, some obsolescence in the material itself. This illustrative material may become less reliable as the occupation evolves. In addition, the user is cautioned against excessive reliance on a given function or assignment as an indicator of work performed only at a specific level.

FACTOR I LEVEL OF PROFESSIONAL ENGINEERING RESPONSIBILITY

This factor measures the impact of the professional engineering responsibilities upon the chief engineer's position. Certain professional responsibilities are common to most, if not all, chief engineers' positions. Top hospital management provides the chief engineer administrative direction with assignments in terms of broadly defined missions or functions. The engineer has responsibility for planning, designing, and carrying out programs, projects, studies, or other work independently. Results of the work are considered as technically authoritative and are normally accepted without significant change. If the work should be reviewed, the review is concentrated on such matters as fulfillment of program objectives and effect of advice and influence of the overall program. Recommendations for new projects and alteration of objectives are usually evaluated for such considerations as availability of funds and other re sources, broad program goals, or hospital priorities. The chief engineer is provided with guidelines including standard instructions, technical literature, agency policies and regulations, manufacturer's catalogs, precedents, and standard practices in the areas of assignments. However, these guidelines are often inadequate in dealing with the more complex or unusual problems encountered. The engineer is required to use resourcefulness, initiative, and judgment based on experience to deviate from or extend traditional engineering methods and practices in developing solutions to problems where precedents are not applicable. The chief engineer is usually responsible for developing material to supplement and explain agency headquarter's guidelines at the hospital level.

The chief engineer typically investigates and analyzes any of a variety of problems or conditions and provides or recommends ways of dealing with them. The engineering determinations often affect the design or operation of equipment or facilities, with regard to economy, efficiency, and safety of the systems involved. To accomplish assigned responsibilities, the chief engineer often establishes personal contacts with a variety of officials, managers, professionals, or executives of the agency and outside organizations. Typical of these contacts are manufacturer's representatives, private architect-engineer firms, specialists at contractors' plants and engineers and architects from the agency headquarters. The purpose of these personal contacts is to influence or persuade other engineers to adopt technical points and methods about which there are conflicts, to negotiate agreements for the agency with contractors where there are conflicting interests and opinions among organizations or among individuals who may be experts in the field, or to justify the feasibility and desirability of work proposals to top hospital management or agency officials at the headquarters.

Professional engineering responsibilities that vary from hospital to hospital include: the professional knowledges and skills necessary to accomplish assigned engineering responsibilities; and the complexity of the work environment from an engineering perspective. In order to assess the impact of the above professional responsibilities on the chief engineer's position, this factor has been divided into two parts. A table is provided at the end of this section to determine the overall professional responsibility of the chief engineer's position.

ELEMENT 1: KNOWLEDGES AND SKILLS

This element measures the nature and extent of information or facts which the engineer must understand to do professionally competent work (e.g., steps, procedures, practices, rules, policies, theories, principles, and concepts) and the nature and extent of skills necessary to apply these knowledges. The professional knowledges and skills of a chief engineer relate mostly to facilities, systems, and equipment in several fields of engineering. For the chief engineer the level of professional responsibility usually increases with the type and number of construction projects that must be accomplished to support the hospital's mission. While some construction projects require a professional knowledge of conventional methods and techniques to accomplish the project, others may require application of advanced developments and use of experienced judgment to solve novel or obscure problems to complete the project. For example, a relatively simple project might include additional air conditioning tonnage. On the other hand, the chief engineer may modernize or construct an entire new surgical suite. As the number of projects and their aggregate costs increase, the occurrence of the more professionally difficult projects usually increases. Increasing project workloads require greater degrees of coordination between related projects and the medical activities of the hospital affected by these projects. For example, during modernization of the surgical suite, the project would have to be designed with built in phases to allow for continued functioning of the unit. Problems resulting from dirt, noise, and necessary shutdowns must be anticipated in the design of the project to minimize these adverse impacts.

To assess the degree of professional knowledge required, several considerations are necessary. The total dollar cost of projects exceeding $10,000 for maintenance, repair, renovation, modernization, and new construction assigned to the chief engineer during the past three years should be reviewed. A three year review provides a time weighted perspective to assess the overall impact of the program.

Degree C: The professional engineering workload of the chief engineer is moderate. There may be up to 20 projects with a total cost of $2 million over a 3 year period. Staff support is usually limited to one or two professional or technical personnel. Projects at this level typically include designing limited phases or segments of utility systems of limited size and complexity which can be accomplished by the application of established engineering methods.

Degree B: At this level the professional engineering workload has substantial impact on the chief engineer's position. The number of projects involved range between 20 and 40 with a total cost of $3 million to $5 million over a three year period. At this level the support staff normally consists of one or more engineers and technical and clerical personnel. At this level some projects present substantial professional difficulties such as:

-- The modernization or establishment of medical treatment areas involving specialized equipment, utilities and structural capabilities;

-- The renovation of an entire structure or major portion of a structure where the work must be carefully phased to minimize disruption of ongoing activities;

-- Projects which have a substantial impact on the day-to-day activities of the hospital.

To accomplish the project workload the chief engineer usually has the professional knowledges and abilities needed to modify standard practices and adapt equipment or techniques to solve a variety of engineering problems. The chief engineer at this level typically adapts precedents or makes significant departures from previous approaches to similar projects in order to provide for the specialized requirements of the users.

Degree A: The professional engineering workload at this level will have a major impact on the chief engineer's position. Projects usually exceed 50 in number with a total cost in excess of $7 million over a 3 year period. At this level there are normally several professional and technical employees usually assigned full time to project work. Projects, such as those described at Degree B, occur with such frequency as to constitute a substantial portion of the total dollar cost. These projects are commonly in progress simultaneously or are so closely interrelated that substantial planning and coordination is necessary to minimize disruption of essential services and activities in the hospital. The chief engineer may be required to apply new developments and experienced judgment to solve novel or obscure problems.

ELEMENT 2: COMPLEXITY OF THE WORK ENVIRONMENT

This element measures the complexity of the chief engineer's position in managing a hospital engineering program which includes professional engineering review and direction of assigned program. Complexity covers the nature and variety of tasks, steps, processes, methods, or activities in the work performed; and the degree to which the chief engineer must vary the work, discern interrelationships and deviations, or develop new techniques, criteria, or information. While most if not all chief engineers have similar program responsibilities, these program magnitudes and complexities depend upon several factors. The age and type of construction of the hospital can complicate the problems involved with construction, renovation, and modernization. For example, older structures built with interior load bearing walls limit options available for modernization and renovation. The number of buildings and the accompanying acreage of the hospital can complicate the problems involved with maintenance, repair, and operations. For example, a chief engineer with responsibility for 25 buildings may need to develop a computerized system to control energy use of the utility systems in these buildings. Hospitals remote from population centers often require a greater degree of self-sufficiency. For example, the chief engineer may need to provide water and sewerage treatment facilities or develop a strong biomedical engineering program because of slow response time from commercial sources.

To specifically measure the complexity of the work environment upon the chief engineer's position several indicators can be used including the physical size and number of operating beds of the hospital and the chief engineer's recurring budget and staff. The size and number of operating beds establish the physical environment within which the chief engineer must execute assigned professional responsibilities. As the size increases, the type, amount, and sophistication of systems and programs usually increase in a similar fashion. For example, a chief engineer, at a hospital with 2 million square feet and numerous buildings, has much greater problems in reviewing and directing, most if not all, assigned engineering programs than at a hospital with 200,000 square feet and a few buildings.

In a similar fashion the chief engineer's recurring annual budget and the size of staff define the resources necessary to accomplish as signed engineering programs. A chief engineer with a staff of 150 will usually have several graduate engineers and technical specialists that would not normally be present with a staff of 35. The larger staffs indicate the more complex situations characterized by frequent rearrangements of work schedules and development of new criteria, techniques and information to meet the changing demands of the engineering workload.

Degree C: At this level the hospital will have up to 200 operating beds including nursing home care beds, and encompass about 200,000 square feet. The chief engineer will be responsible for managing an annual recurring budget, excluding salaries, of some $500,000. The engineering staff may total 25 employees.

Degree B: The engineering program magnitude at this level is almost twice that of Degree C. The hospital may have from 200 to 700 operating beds with a physical complex of 350,000 to 700,000 square feet. The annual budget, excluding salaries, controlled by the chief engineer ranges from $1 to $2 million, with 60 to 100 employees. Assignments are typically diverse covering a number of essentially different mechanical, electrical, and pneumatic systems and equipment in the hospital. The work requires recognition of the relationship of problems and practices of related engineering fields either to solve the engineering problem or refer it to the appropriate source for resolution.

Degree A: At this level the programs are substantially greater than those of Degree B. The operating bed capacity exceeds 900 with more than 1 million square feet of space. The yearly operating budget, excluding salaries, will exceed $3 million with more than 130 employees. Assignments typically involve design, modifications, requirements, definitions and engineering evaluations. Assignments are diverse in nature and cover a number of essentially different mechanical, electrical, and pneumatic systems and equipment found in large multistory or multibuilding hospitals. In some instances, assignments deal with the inapplicability of established criteria and technical precedents to program objectives thus requiring sound judgment to solve problems, meeting major objectives without compromising engineering principles. The work also requires recognition of the relationship or problems and practices of related engineering fields either to solve engineering problems or refer them to the appropriate source for resolution.

FACTOR I
LEVEL OF PROFESSIONAL ENGINEERING
RESPONSIBILITY TABLE

ELEMENT 1	ELEMENT 2		
KNOWLEDGES AND SKILLS	COMPLEXITY OF THE WORK ENVIRONMENT		
Level	C	B	A
C	I	I	II
B	I	II	III
A	II	III	III

The level of professional engineering responsibility obtained from this table is to be used in the grade conversion table on the last page of the guide.

FACTOR II COMPLEXITY OF OPERATING SITUATION

This factor measures the impact of the hospital's operational and environmental characteristics on the managerial complexity of the chief engineer's position. Increases in managerial complexity are manifested in areas such as increased complexity of organizational relationships; a greater need for executive knowledge, skills, and abilities as the chief engineer supports and assists top hospital management in planning, coordinating, controlling and directing programs, operations, and increased occasions for making difficult decisions and resolving substantive problems. Although not all inclusive, activities in the hospital such as medical school, affiliations, special medical programs, and the kind and amount of medical equipment, have a direct bearing on the managerial complexity of the chief engineer.

Active medical school affiliations, with the influx of medical students and residents along with consulting and attending physicians who supervise them, create additional problems in personnel and resource management. The rapid turnover of the medical school affiliates, and their unfamiliarity with government hospital operations, make it especially critical for the chief engineer to support top hospital management's efforts to establish stable and effective management systems to integrate these affiliates into the hospital organization and its patient care program.

The chief engineer typically must also establish assigned programs consistent with top hospital management's efforts. For example, the chief engineer frequently consults with medical school officials to assure that state-of-the-art equipment and facilities are provided, maintained, and modified to meet changing needs characterized by a medical teaching environment.

Similarly, special medical programs add a further dimension of complexity to the chief engineer's position. Such programs as intensive care units, hemodialysis, respiratory care, nuclear medicine, supervoltage therapy, cardiac catheterization laboratories, and the like are

often characterized by high concentrations of equipment and specialized functional space requirements. The chief engineer is usually required to assure that facilities and equipment are adequate to meet the changing medical needs of these programs. The chief engineer frequently must interact with these program directors and adjust assigned engineering services and budgets to accommodate needed changes. Problems identified by this interaction and observation, which are beyond the engineer's scope of responsibility, are brought to the attention of top hospital management as recommendations for corrective action. The kind and amount of medical equipment frequently indicate the sophistication of the medical activity at the hospital and create special problems for the chief engineer. For example, the chief engineer usually develops and changes policies and procedures to assure that purchased equipment is safe and efficient; facilities are compatible or changed to be compatible with purchased equipment; and that once installed, the equipment performs or is modified to perform properly during its useful life.

Degree C: This level of operating situation includes hospitals which usually provide primary health care services or specialize in neuropsychiatric treatment. In this situation, the limited number of services provided restricts the kinds and volume of administrative and management problems with which the chief engineer must deal. Degree C hospitals typically have fewer than five medical school affiliated residency programs and between four to seven special medical programs. The acquisition value of medical equipment is usually less than $1 million, representing an inventory of moderate variety and sophistication.

Degree B: Hospitals at this level provide health care services of moderate variety and intensity, but they typically are not equipped to treat patients who require the most specialized and sophisticated medical and surgical procedures. Degree B hospitals typically have medical school affiliations that substantially impact the operation of the hospital. They have between 10 and 15 medical school affiliated residency programs and between 9 and 11 special medical programs. These special medical programs are of sufficient complexity to have substantial impact on the chief engineer's programs. The acquisition value of medical equipment is between $2 million and $5 million, representing an inventory of substantial variety and sophistication.

Degree A: The intensity of care, rate of activity, and broad program mission of hospitals at this level generate numerous, complex problems which constantly tax the management skills of the chief engineer. These problems arise from the rapid fluctuation in various program requirements, frequent conflicts between various program requirements, and the many conflicts between program requirements and available resources. In this situation, the engineer frequently must make prompt decisions which require consideration of a wide range of factors and have a direct impact on the mission of the hospital. Degree A hospitals typically have medical school affiliations of high activity with major impact upon the operation of the hospital. They generally have more than 20 medical school affiliated residency programs and usually more than 15 special medical programs. The acquisition value of medical equipment usually exceeds $7 million and represents some of the most sophisticated state-of- the-art technology available.

GRADE CONVERSION TABLE

After being evaluated in terms of the criteria presented in the preceding factor level definitions, chief engineer positions are to be assigned to grade levels in accordance with the following table:

FACTOR II	**FACTOR I**		
COMPLEXITY OF OPERATION SITUATION	**LEVEL OF PROFESSIONAL ENGINEERING RESPONSIBILITY (FROM TABLE ON PAGE 17)**		
Level	I	II	III
C	GS-12	GS-13	GS-13
B	GS-13	GS-13	*
A	GS-13	GS-14	GS-14

* Operating situations at this level of complexity do not typically involve professional engineering knowledges and skills/work environment complexity at this level of difficulty. When this situation does occur, the position may be classified at either the GS-13 or GS-14 level depending upon the absence or presence of significant weakening or strengthening factors. Please refer to pertinent material included in the *Evaluation Notes* section of this guide.