

Grade Level Guide for Test and Evaluation Work in Engineering and Science Occupations

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GUIDE DEFINITION

This guide is for use in determining the grade level of nonsupervisory test and evaluation engineering work performed by professional engineers in planning, monitoring, and conducting tests of equipment, materials, and systems; assessing or evaluating test data and results; and preparing reports of findings. Work covered by this guide typically includes: (a) modifying, adapting, or extending standard test and evaluation guides, precedents, criteria, methods, and techniques; (b) designing and using new test procedures and approaches; or (c) performing staff assignments such as technical consultant, planner, evaluator-advisor, and/or program coordinator in a test and evaluation engineering organization. Similar work in the physical science professions may also be graded using this guide.

This guide supersedes the Test and Evaluation Engineering Grade-Level Guide, GS-800, published in March 1981.

COVERAGE

This guide provides grade level criteria for nonsupervisory test and evaluation engineering work at grades GS-9 and above in FES format. Agencies may establish positions below GS-9 as needed for entry and development of new employees. Work at such levels may be evaluated by use of the primary standard for the Factor Evaluation System (FES) or an appropriate standard covering professional work in the Engineering and Architecture Group, GS-800, or Physical Sciences Group, GS-1300, and should reflect common patterns for entry and developmental levels.

This guide does not contain series information. The occupational series of a position classified fully or in part by this guide should be determined through reference to the Handbook of Occupational Groups and Series and/or occupational information in specific series coverage standards. Series determination should be based upon consideration of the primary duties and responsibilities involved and the qualifications required in the position. Official position titles are assigned by following guidance in published classification standards for the series or general instructions for titling in the Introduction to the Position Classification Standards.

RELATED GUIDES

1. The Research Grade Evaluation Guide may also be used in evaluating engineering work involved in testing within a research organization.
2. The Equipment Development Grade Evaluation Guide should be used to evaluate work which primarily involves testing during the development of an item for such purposes as collecting design data, confirming preliminary concepts, and determining compatibility of components. The Equipment Development Grade Evaluation Guide is also used to evaluate work in development and evaluation organizations which are not responsible for a

test program (e.g., positions which primarily involve developing test equipment or conducting evaluation studies prior to development of such equipment).

HOW TO USE THIS GUIDE

Step 1: Compare each of the nine factors in the position description with its counterpart in the guide. For each factor, select the appropriate factor level and credit the designated points using the Factor Level Descriptions which follow the introductory material. (If work falls between two levels, credit the points designated for the lower of the two levels.)

[For the convenience of the user, a simplified, optional grade evaluation format is provided In the Appendix to this Guide.]

Step 2: Convert total points to grades using the grade conversion chart below.

GRADE CONVERSION TABLE

Total points on all evaluation factors are converted to GS grade as follows:

GS Grade	Point Range
9	1855-2100
10	2105-2350
11	2355-2750
12	2755-3150
13	3155-3600
14	3605-4050
15	4055- up

Entry level and developmental positions may be graded using the primary standard, other engineering or physical science standards, and sound classification judgment.

DESCRIPTION OF TEST AND EVALUATION WORK

Test and evaluation engineering work is concerned with (1) the study of conditions which produce and control changes in items and systems; (2) determination of operational or technical adequacy of item or system requirements or specifications; and (3) assessment of the technical suitability of an item or system where specifications do not exist or are indefinite or inadequate.

Although the description of test and evaluation work below is based primarily on engineering occupations, work performed by physical scientists is covered by this guide when the work processes are similar.

Test and Evaluation Assignments

Test and evaluation engineering assignments involve performance of, or responsibility for:

- study and interpretation of operational requirements, specifications, military characteristics, or other types of requirements for the item/system to ascertain the specific investigations to be conducted and the specific data to be obtained;
- overall planning of test projects, including assignment of personnel, facilities, and equipment;
- planning test experiments, including determination of test procedures, test limits, and instrumentation;
- setup and interconnection of test equipment and item/system undergoing test;
- development, modification, or adaptation of test equipment as appropriate;
- conduct of test experiments, including directions for recording data;
- analysis, interpretation, and evaluation of test data and results; and
- preparation of test reports outlining test procedures used, data and results obtained, conclusions, and pertinent recommendations and suggestions relative to the acceptability or application of item/system tested or the validity of test data when controversial test methods are applied.

Test and evaluation work covered by this guide normally involves most of the following:

1. Test Design -- The engineer plans a series of tests to determine whether an item or system meets basic requirements. The test engineer must ascertain what tests are to be performed, whether current test methods will yield valid results, if test facilities are adequate for the item, and if instrumentation is adequate to achieve accurate test data. When an item is particularly complex, unique, or of strategic importance, basic test planning often occurs at the same time the item is being developed, and requires continuing contact with the development engineer.
2. Test Coordination -- The engineer considers any or all of the following factors:
 - (a) Types of tests to be performed;
 - (b) Quantity of items available for test;
 - (c) Inherent safety hazards in testing;

- (d) Availability of required resources (e.g., environmental chambers, shock and vibration machines, test ranges, computer equipment) and support staff;
- (e) Current workload at test facilities in terms of other tests, equipment, and human resources;
- (f) Required completion date;
- (g) Priority given to the item by the activity; and
- (h) Estimated cost and funds available for special test support.

The test engineer determines the salient factors to be considered for the specific item to be examined and gains agreement from all concerned as to where, when, and how the item is to be tested.

3. Test Direction -- The engineer conducts or oversees testing, participating as needed in operating equipment or gathering data to ensure that a valid test is being accomplished.

Test and evaluation engineers at trainee or developmental levels may be assisted by aids or technicians. At more advanced levels, test and evaluation engineers typically plan, coordinate, and monitor the work of lower grade engineers, technicians, craft workers, and/or military support personnel; evaluate the progress and results obtained; and recommend major changes to achieve overall objectives.

4. Data Evaluation -- The engineer applies knowledge of the test item; conditions under which it was tested; the actual conditions under which the item will have to function; its serviceability, maintainability, reliability and cost; relative statistical validity of the test results; and the accuracy of the instrumentation used. The range of complexity extends, for example, from (1) the examination of data of a simple shock test of a component conducted at normal temperature and pressure to the examination and evaluation of data derived from a test where it is necessary to simulate the effects of outer space on an extremely complex and sensitive instrument package; or (2) individual missile or gun firings by a single ship to complex multi ship exercises.
5. Report Preparation -- The test engineer prepares reports on the results of tests. In some instances, this simply involves the testing of production items against specifications where the number of samples ensures relatively sound statistical validity and, therefore, the preparation of a straight-forward, factual report. On the other hand, the test may involve one or more samples of a complicated system that calls for intricate, detailed, and interpretive analysis of the test results, a depth of knowledge of the test item and the test facilities and instrumentation, and preparation of a lengthy and complex report.

Relationships with Contractors

A significant aspect of most test and evaluation engineering work in the Federal Government is the requirement for establishing and maintaining working relationships with contractors. This typically includes:

- Working with primary contractors, such as industrial developers or manufacturers of items or equipment.
- Working with support contractors providing engineering, technician, trades and labor, data acquisition, or other services in support of test facilities.

Computer Related Knowledges

Computer systems are employed to support such test related activities as data acquisition, real-time control, monitoring, modeling, and simulation. Many test engineers are concerned with the storage, manipulation, transformation, analysis, or presentation of information by means of computer systems. Some test engineers are concerned with the hardware aspects of computing systems. With increasing use of minicomputers and microprocessors as test instruments, they may also be responsible for the development or improvement of appropriate software.

COMPLEX FEATURES

An important consideration in grading engineering positions is the presence of "complex features." Variations in the relative difficulty of test and evaluation work evidenced by the number of complex features and by their occurrence in combination. The interaction of complex features in combination is particularly significant.

Reference to "complex features" is part of "Factor IV - Complexity" and other factors in this standard. In some instances, the term is defined by example or criteria. Where this is not the case, or where the term is used elsewhere in this standard, the definition below applies.

For purposes of applying this guide, the phrase "complex features" denotes any assignment, test, test phase, or equipment aspect or characteristic which requires:

- modification, adaptation, or adjustment of standard criteria, guides, precedents, methods, procedures, or techniques; or
- special considerations in planning, scheduling, negotiation, or coordination; or
- resolution or treatment of engineering or scientific problems extending beyond routine application of standardized procedures.

A complex feature can involve technical test and evaluation engineering work, human factors, economic, socioeconomic, administrative, or other aspects of test and evaluation engineering work as illustrated in the following examples:

- It is necessary to analyze and choose from two or more alternative approaches from the standpoint of test and evaluation measurement and engineering feasibility, when each alternative comprises methods, procedures, and techniques whose advantages/disadvantages are not readily, fully, or clearly identifiable. For example, funding or other resource considerations may prescribe choices and accommodations between a theoretically ideal method and more economical but technically less desirable methods.
- Agency policy, national priority, or other considerations or constraints necessitate analysis, evaluation, and weighing of alternatives.
- High visibility, as when testing and assessing products of competing contractors or nationally distributed consumer products, which necessitates additional documentation, demonstration, security, or public relations measures.
- In making modifications or improvements to existing test facilities, it is necessary to: (a) modify the instrumentation for gathering and recording data not anticipated when the facility was originally designed; (b) keep changes and costs to a minimum while achieving objectives; or (c) modify test and evaluation procedures, methods, and techniques to conform to limitations of existing test facilities.
- Previous tests/projects are not directly applicable to all phases, and existing precedents, methods, and techniques are inadequate because of differences in data to be obtained and analyzed, or in the item, system, subsystem, and/or performance characteristics. It is necessary to devise new tests and alter them to suit the particular test item and/or data requirements.
- The test requires a multi disciplinary approach or technical coordination of work performed at various sites or by contractors.
- The project requires meeting the differing needs of more than one agency or an agency of a foreign nation.
- Unusual urgency, program criticality, or tight deadlines are present.
- Because of limited numbers, sophistication, or expense of test articles or facilities, it is necessary to minimize damage to (or plan for restoration of) test items, testing equipment, or test facilities.

FACTOR LEVEL DESCRIPTIONS

Following are factor level criteria for Factor 1 - Knowledge Required; Factor 2 - Supervisory controls; Factor 3 - Guidelines; Factor 4 - Complexity; Factor 5 - Scope and Effect; Factors 6/7 - Personal Contacts and Purpose of Contacts; and Factor 8 - Physical Demands; and Factor 9 - Work Environment. Test and evaluation work which does not fully meet the intent of a factor level should be credited at the next lower level.

FACTOR 1 - KNOWLEDGE REQUIRED

Use this factor to evaluate the information a test and evaluation engineer must understand and the skills needed to apply this knowledge to do competent, productive work. (Examples of how knowledge is applied are found in Factor 4, Complexity.)

Level 1-6 -- 950 points

- Professional knowledge of conventional methods in a specialized area of testing and evaluation within an engineering or scientific discipline.
- Knowledge and skill typically acquired through a bachelor's degree and additional experience or graduate study.
- Working knowledge of one or two related engineering and scientific disciplines applicable to the specialized area.

Level 1-7 -- 1250 points

- Professional knowledge of a wide variety of test and evaluation activities in a specialized area within an engineering or scientific discipline.
- Knowledge of the state-of-the-art in the specialized area.
- Skill to apply the standard practices of related engineering and scientific disciplines to the specialized area.

Level 1-8 -- 1550 points

- In-depth knowledge of testing and evaluation in an engineering or scientific discipline which is sufficient to modify and extend theories and/or practices in the specialty field (e.g., marine air traffic control and landing systems) including related engineering and scientific disciplines as they apply. In staff positions, equivalent knowledge to make

recommendations which result in significant changes to important areas of test and evaluation programs.

- Considered a technical expert in the specialized area by the organization.

Level 1-9 -- 1850 points

- Mastery of a broad area of testing and evaluation which may cross engineering and scientific disciplines (e.g., the full range of air armament, electronic countermeasure, and munitions guidance systems, or the full range of tracked combat vehicle systems for a military service) that is sufficient to:

- demonstrate unusual expertise in the broad area; and
 - develop new hypotheses and theories in the broad area; or
 - develop testing policies, philosophies, concepts, etc.
- Recognized nationally as an expert and consultant in the broad specialty field.

FACTOR 2 - SUPERVISORY CONTROLS

Select the level which best describes the nature and extent of direct and indirect controls exercised by the supervisor, project leader, senior engineer or scientist, or other designated employee. Supervisory Controls is generally evaluated on three major aspects:

- how the work is assigned to the employee;
- the employee's responsibility, independence, and authority in carrying out the work; and
- the extent and purpose of the review of the employee's work.

Level 2-2 -- 125 points

The supervisor, project leader, or senior test engineer or scientist provides continuing or individual assignments by indicating generally what is to be done, limitations, quality and quantity expected, deadlines, and priority of assignments. The supervisor provides additional, specific instructions for new, difficult, or unusual assignments, including suggested test methods or advice on source material available.

The employee uses initiative in carrying out recurring assignments independently without specific instructions, but refers deviations, problems, and unfamiliar situations not covered by instructions to the supervisor or senior employee for decision or help.

The supervisor assures that finished work and test and assessment methods used are technically accurate and in compliance with instructions or established test, analysis, and reporting procedures. Review of the work increases with more difficult assignments if the employee has not previously performed similar assignments.

Level 2-3 -- 275 points

The supervisor makes assignments by defining objectives, priorities, and deadlines, and assists employees with unusual situations which do not have clear precedents.

The employee plans and carries out the successive steps and handles problems and deviations in the work assignment in accordance with instructions, policies, previous training, test precedents, or accepted practices.

Completed work is usually evaluated for technical soundness, appropriateness, and conformity to policy and requirements. The methods used in arriving at the end results are not usually reviewed in detail, except in nonroutine assignments which have substantial impact (on budget, policy, or lives) or involve novel solutions, major controversies, unprecedented test designs, intractable problems, or numerous, complex problems.

Level 2-4 -- 450 points

The supervisor sets the overall objectives and resources available. The employee and supervisor, in consultation, develop the deadlines, projects, and work to be done.

At this level the employee, having developed expertise in the line of work, is responsible for planning and carrying out the assignment; resolving most of the conflicts which arise; coordinating the work with others as necessary, and interpreting agency and activity test and evaluation policy on own initiative in relation to established objectives. In some assignments, the employee also determines the approach to be taken and the methodology to be used. The employee keeps the supervisor informed of progress, potentially controversial matters, far-reaching implications, or intractable problems.

Completed work is reviewed only from an overall standpoint in terms of feasibility, compatibility with other work, or effectiveness in meeting requirements or expected results.

Level 2-5 -- 650 points

The supervisor provides administrative direction with assignments in terms of broadly defined testing/evaluation missions or functions.

The employee has responsibility for planning, designing, and carrying out test/evaluation programs, projects, studies, or other work independently.

Results of the work are considered technically authoritative and are normally accepted without significant change. If the work is reviewed, the review concerns such matters as fulfillment of test and evaluation program objectives, effect of advice and influence on the overall program, or the contribution to the advancement of technology. Recommendations for new projects and alteration of objectives are usually evaluated for such considerations as availability of funds and other resources, broad program goals, or agency priorities.

FACTOR 3 - GUIDELINES

This factor covers the nature of guidelines and the judgment, initiative, or ingenuity needed to apply, adapt, or develop them. Test and evaluation guidelines either provide reference data, outline work processes and procedures, or impose constraints on the use of knowledges.

Use this factor to evaluate:

- the kind, specificity, availability and applicability of documentary, schematic, precedential, and similar guidelines for the work; and
- the constraints and judgmental demands placed upon the employee, e.g., in selecting, applying, adapting, or researching existing guidelines, or developing new guidelines.

Test and evaluation guidelines include, but are not limited to:

- scientific, engineering, and technical textbooks, handbooks, and publications;
- manuals of test and evaluation instructions and procedures;
- manufacturers' and contractors' catalogs, contracts, and documentation;
- reports of previous tests conducted by the activity, agency, developer, contractor, or others;
- systems test plans, specifications, and checklists;
- test and evaluation methods as taught in engineering courses, or generally accepted by professionals in the area of application;
- governing policies, requirements, and regulations of the activity, command, agency, customer, and/or public law.

Level 3-3 -- 275 points

Numerous guidelines, such as those listed above, are available and largely, but not completely, applicable.

The engineer or scientist selects, interprets, and applies test and technical plans, specifications, practices, procedures, regulations, precedents, requirements, and other guidelines which cover most but not all aspects of the assignment. For example, these guidelines are sometimes not completely applicable to, or do not specifically address, all of the requirements, problems, circumstances, time frames, conditions to be simulated, data gathering techniques used, or equipment involved in the assignment. Therefore, the engineer uses judgment in making limited changes and adaptations to meet local conditions, new situations, or minor differences in test items; or to cover gaps in specificity; or to improve safety, economy, efficiency, or applicability. The employee may also use judgment in analyzing results or recommending further changes to guidelines.

Level 3-4 -- 450 points

Guidelines are available, but are often inadequate, very general, or contain critical gaps; or are of only limited use for major test segments, complex problems in the project, minor differences from past test items, or facilities available. The engineer makes major changes, additions, and extensive adaptations to guidelines, and uses judgment in analyzing costs/benefits of various alternatives and selecting the best combinations.

Some projects require the engineer or scientist to design and execute novel testing procedures or to resolve problems where precedents are not applicable; or to obtain needed information within tight time frames and cost constraints; or to utilize new products, techniques, or facilities for the first time at the test facility; or to develop new technical methods or criteria; or to develop proposed new local policies for a major test facility of specialty area; or to supplement, explain, or adapt agency headquarters guidelines for use throughout field activities.

Level 3-5 -- 650 points

Guidelines consist of broad, nonspecific policy statements or basic laws which require extensive interpretation, judgment, and ingenuity in developing applications to specific work areas; or in developing new test and evaluation hypotheses, approaches, and concepts; or in developing nationwide test and evaluation standards, policies, and instructions.

The employee is typically recognized as a technical authority in the development of test and evaluation guidelines for the area of specialization, and is regularly called upon to use this expertise and judgment to resolve extremely complex, intractable problems for a major testing laboratory, command, or agency.

FACTOR 4 - COMPLEXITY

Use this factor to evaluate:

- the nature, number, variety, intricacy, and relatedness of steps, processes, and techniques used in the work;

- the degree of difficulty in identifying what needs to be done, and in planning and organizing work;
- the complexity inherent in the assignment, including: problem-solving difficulty; breadth, depth and intensity of mental, coordinative, or project management effort required; and originality or creativity involved.

Level 4-3 -- 150 points

Assignments require application of standard techniques, procedures, and criteria in carrying out a series of related test engineering tasks. Test engineers or scientists typically are assigned individual project phases or projects of limited scope, such as those that require minor adaptation of existing methods and techniques. Engineers also may work on segments of broader, more complex assignments of a higher grade engineer, where objectives are clearly specified. Work involves conventional types of plans, investigations, equipment, or systems, with relatively few complex features.

Illustrations:

- Reviews design drawings and specifications, test schedules, plans, procedures, etc., and ensures that they are consistent with one another, with activity specifications, and with sound engineering principles.
- Participates in setting up tests, compiling and analyzing preliminary data.
- Makes tentative and preliminary selections and adaptations from alternatives and, after approval, carries out sequences of detail.
- Resolves minor problems involving scheduling, test procedures, and results and systems integration. Modifies established techniques slightly to accommodate changing requirements or local conditions.
- Applies methods and techniques of operation utilized in similar tests. Determines if test results are reasonable based on specific performance parameters and estimates of preliminary data.

Level 4-4 -- 225 points

The engineer or scientist plans, coordinates, and monitors test projects that frequently require significant modification of standard practices or adaptation of instrumentation to obtain valid results. The engineer plans, monitors, and evaluates tests, including those of considerable complexity, which: (1) involve new or novel devices, equipment, or systems, requiring a need for increased innovation, or (2) require increased engineering skills and imagination as, for example, in simulating unusual operational conditions, or (3) involve conventional test engineering practices, but include several complex features (e.g., various modifications of precedent, special

considerations in planning, conflicting test requirements, unsuitability of conventional materials, and difficult test coordination requirements).

The employee assesses the feasibility and soundness of proposed engineering evaluation tests when necessary data are insufficient or confirmation by additional testing is advisable.

Originality is required at this level because there is a greater need to modify standard methods and techniques. The engineer makes recommendations and commitments on the conventional aspects of the testing assignments.

Illustrations:

- Assignments require trade-off studies for establishing requirements or evaluating a course of action. System and component design and testing analyses require a thorough professional understanding in order to evaluate new or modified equipment.
- Assignments involve complete field tests of items and components to acquire performance characteristics involving many individual tests, requiring consideration of the interrelationships of the various results of tests in evaluating the item or component.
- Assignments include the full variety of material and studies within the commodity area of interest involving complete systems of conventional nature which typically embody the latest scientific advances, and encompass the entire development cycle and involve the full range of associated tests.
- Assignments frequently require use of nonstandard test techniques and the development of new procedures in order to obtain and analyze data significantly different from those obtained in previous tests/projects, or to test new or experimental materiel and systems. Some assignments require devising new tests or designing tests to suit a particular item.

Level 4-5 -- 325 points

Assignments involve new concepts and new and varied problems to be solved, and demand technical expertise and knowledge of the state-of-the-art in testing technology. At this level, assignments are of considerable breadth, diversity, and intensity and have many varied complex features, so that it is extremely difficult to design tests and gather reliable data. Existing precedents, methods, and techniques are inadequate or contain critical gaps. A high degree of originality is required to design and employ novel testing procedures in order to obtain useful information. Problem solving may require the engineer or scientist to organize and lead teams using multi disciplinary and matrix-management techniques.

The engineer or scientist plans, coordinates, monitors, and assesses or independently evaluates unique and highly complex projects, including test and evaluation of equipment and systems of significant magnitude, scope, and difficulty. Assignments typically contain a combination of a significant number of complex features which involve serious or difficult-to-resolve conflicts

between engineering and management requirements. Comprehensive, interpretive reports cover projects of major significance, extensive cost, complexity, and strategic importance. Assignments also involve test and evaluation of complex major systems and subsystems to improve service and expand capacity.

Illustrations:

- The engineer conceives, plans, and conducts test and evaluation of problem areas that must be approached through a series of complete and conceptually related studies, are difficult to define; require unconventional or novel approaches, and require sophisticated research techniques.
- The engineer must deal effectively with many diverse requirements (both environmental and functional) inherent in the test of multi system articles, and ensure that documentation, personnel training, safety requirements, and subsystems of the test facility are made ready and accomplished within tight budgetary/time constraints.
- Assignments involve new designs, modified designs, engineering, and scientific evaluations, performance analysis, and development of solutions to problems, all of which apply to major systems and/or related technology. The engineer is required to make immediate and accurate judgments during high stress test operations that affect the safety of personnel and of the test article.

Level 4-6 -- 450 points

Assignments (a) concentrate on the limitations of proven concepts and practices of a broad and complex subject-matter field/testing and evaluation area where issues and factors to be considered are largely undefined and require extensive probing and analysis to determine the nature and scope of the problem; and (b) are characterized by unusual demands that are frequently due to extraordinary emergency, public interest, or economic restraints which create a need for the engineer to pursue unique, time saving, cost reducing solutions that are considered extreme within the context of standard guides, precedents, methods, and techniques. Test and evaluation assignments are carried to the point that either a solution is delivered on various problems or alternative further testing projects are initiated and pursued concurrently or sequentially with the support of others within or outside the organization. These often alter standard concepts, theories, objectives, and/or previously established requirements and criteria.

The test engineer recognizes the need for and initiates investigations to advance the techniques of testing that will permit the evaluation of material under new conditions, make possible new measurements not heretofore possible, or improve the engineering data secured in tests in terms of validity and/or cost.

The engineer develops and contributes new test and evaluation criteria, principles, and techniques that are regarded as major advances in the field.

Illustrations:

- Assignments involve a highly complex segment of a major test program/high visibility project with extensive and diversified test engineering requirements, or the entire test program, system, or major project of an organization. The overall test project contains critical problems, the solution of which requires major technological advances, and paves the way for extensive related development.
- Assignments involve an important segment of a very extensive and highly diversified test engineering system/project/program, or the entire test engineering system/project itself. The test programs and problems to be resolved consist of several segments of exceptional complexity and critical importance to the overall agency mission, and include problems of extraordinary difficulty that have resisted solution.
- Problems encountered are characterized by lack of scientific precedents and source material or lack of success in prior test and evaluation. Their solution would represent an advance of great significance and importance.
- Assignments require the coordination of the activities of representatives of the employing organization, contractors, and user personnel for the purpose of conducting test/experiments concerning state-of-the-art devices, involving various systems and capabilities of the organization's facilities.
- Assignments relate to the overall program test plans for all of a major center's hardware programs and involve state-of-the-art advances in the areas of test program management requirements definition, hardware design, and technical approaches.
 - Systems and components involved are of a prototype and developmental nature. Continuous adjustments must be made to accommodate the major item in various stages of readiness, and to accommodate overlapping missions or projects and/or changes necessitated by advanced technology.

FACTOR 5 - SCOPE AND EFFECT

Consider the general breadth, depth, and purpose of the work. Then select the level below which conveys the magnitude of the effect(s), result(s), or other impact of properly performed work.

Level 5-2 -- 75 points

Work involves limited, specific test or support procedures or other routine engineering or scientific tasks of limited complexity which are typically segments of a senior engineer's or scientist's projects.

Work affects the accuracy, reliability, or acceptability of further test and evaluation processes.

Level 5-3 -- 150 points

Work involves planning, executing, or assessing conventional tests using established criteria, and performing related investigations or analyses of conditions, facilities and related efficiency, economy, or safety conditions.

Work has a direct or significant effect on one or more of the following:

- operation or design of conventional equipment, systems, or components;
- adequacy of local testing operations;
- standardization of equipment for general purpose use;
- successful development or technological improvement of items; or
- safe use of common consumer products.

Level 5-4 -- 225 points

Plans tests, establishes criteria, assesses program effectiveness, or investigates and analyzes unusual testing conditions, problems, or questions.

Work facilitates development, production, design, procurement, or manufacturing in agencies, commands, programs or industries; or affects the efficiency or productivity of a test facility or activity; or results in significant new testing techniques; or involves staff level assessments which are often the technical bases for large agency expenditures; or affects resolution of significant consumer safety issues.

Level 5-5 -- 325 points

Resolves critical problems. Isolates and defines unknown conditions, or develops new theories, or provides expert consultative advice.

Work affects:

- development of major aspects of scientific, public safety, or military programs or missions; or
- large numbers of people; or
- work of other experts; or

- design or purchase of major new testing facilities or major modifications of existing facilities.

Level 5-6 -- 450 points

Plans, develops, and carries out vital test and evaluation engineering programs. These programs are key to accomplishing an engineering or scientific program of national scope or impact.

FACTORS 6/7 - PERSONAL CONTACTS AND PURPOSE OF CONTACTS

Match the level of assigned regular and recurring personal contacts with their purpose, and credit the appropriate point value using the chart below. The contacts may be face-to-face or by telephone, radio, video conference, or similar means. Above the lowest level, credit is to be given only for contacts which are essential for successful performance of assigned duties.

Personal Contacts

1. Engineers, scientists, and technicians within the office or in closely related test and support units.
2. Engineers, scientists, and technicians within the agency, outside the employee's work unit and at various organizational levels.
3. Designers and developers of test items, contractor technical experts, and/or scientists and engineers at other agencies, often in unstructured settings. Attorneys, news reporters, and representatives of professional organizations or public action groups may also be included.
4. High ranking officials of Federal, state, major municipal, or foreign governments, or large private sector engineering organizations; or nationally recognized news reporters, journalists, or media representatives, in a variety of sensitive, problematic or unstructured settings.

Purpose of Contacts

- a. To exchange facts or information.
- b. To coordinate work efforts and solve technical problems with cooperative individuals.
- c. To persuade individuals and groups with differing opinions or interests to change criteria or methods, accept findings, or reach agreement on technical points. Contacts may be uncooperative, skeptical, or contentious, requiring skill in persuasion, negotiation, motivation, or establishment of rapport.

d. To negotiate, justify, or resolve important or controversial test engineering matters, in representing a significant test and evaluation program, project, or activity, including active participation in hearings, high level conferences, or meetings on issues of considerable consequence or importance.

PURPOSE

C O N T A C T S		a	b	c	d
	1	30	60	130	230
	2	45	75	145	245
	3	80	110	180	280
	4	130	160	230	330

FACTOR 8 - PHYSICAL DEMANDS

This factor covers the physical abilities, demands, and exertion involved in accomplishing work. All positions receive the minimum credit of 5 points under this factor. To receive classification credit (i.e., points) above the minimum for this factor, the demand must:

- affect the work of the position/incumbent on a regular and recurring basis; and
- require the use of knowledge, skill, training, procedures, or protective gear described in the position description or in the occupational classification standard; and
- be subject to control, reduction, elimination, or prevention by the incumbent.

To determine the appropriate point credit, select the highest level of Physical Demands regularly required. This includes consideration of physical strength, stamina, agility and dexterity, along with consideration of the frequency and intensity with which physical skills and training (conditioning) are used to accomplish test and evaluation work without injury to self or others.

NOTE: Regulations governing pay for irregular or intermittent duty involving physical hardship or hazard--and for those with significant adverse effects not practically eliminated using required or provided knowledges, skills, training, or protective gear--are in Chapter 550, Federal Personnel Manual.

Level 8-1 -- 5 points

No special physical effort, strength, stamina, skill, or training is needed to meet this level. The work is sedentary or may involve some walking, standing, bending, or carrying of light items; or involves driving vehicles with automatic transmissions over paved roads.

Level 8-2 -- 20 points

The work requires physical skills and training, and some dexterity, agility, strength, or stamina to accomplish tasks, avoid injury, or reduce adverse effects of moderate physical stress or exertion. Work typically involves:

- long periods of standing; and/or
- frequent bending, stooping, crouching, reaching, stretching; and/or
- walking or running over rough terrain or minor surface obstacles; and/or
- climbing in, out, on, or around machinery, weapons, vehicles, aircraft, or vessels; and/or
- driving vehicles with manual (i.e., nonautomatic) transmissions over rough terrain.

Level 8-3 -- 50 points

The work requires considerable strength, stamina, physical skills, and training to perform, avoid injury, or reduce the adverse effects of strenuous physical activity. Work typically involves:

- climbing tall or vertical ladders, towers, or structures; and/or
- lifting heavy test equipment (over 23 kilograms (50 pounds)); or comparable effort in positioning heavy test items; and/or
- crouching, crawling, climbing, or performing physical tasks in tight areas.

FACTOR 9 - WORK ENVIRONMENT

This factor covers the environmental risks, dangers, discomforts, and hardships which the employee must cope with in accomplishing work. All positions, regardless of environment, receive the minimum credit of 5 points under this factor. To receive classification credit (i.e., points) above the minimum for this factor, the hardship, condition, risk, danger, or discomfort must:

--affect the work of the position/incumbent on a regular and recurring basis; and

--require the use of knowledge, skill, training; procedures, or protective gear described in the position description or in the occupational classification standard; and be subject to control, reduction, elimination, or prevention by the incumbent.

To determine the appropriate point credit, select the highest level of Work Environment in which the employee regularly carries out assignments. This includes consideration of the knowledge, skill and training used to control, reduce, eliminate or prevent injury or discomfort resulting from exposure to physical surroundings or performance of work.

NOTE: Regulations governing pay for irregular or intermittent duty involving physical hardship or hazard--and for those with significant adverse effects not practically eliminated using required or provided knowledges, skills, training, or protective gear--are in Chapter 550, Federal Personnel Manual.

Level 9-1 -- 5 points

Work involves exposure to ordinary tasks and discomforts. The engineer is typically required to know and apply normal safety precautions, e.g.,:

- avoidance of trips and falls;
- observance of fire regulations and traffic-signals; and
- safe use of office equipment.

The work area is adequately lighted, heated, and ventilated. Work may involve occasional exposure for short periods (e.g., at indoor or outdoor test sites) to conditions comparable to those in level 9-2 of this factor.

Level 9-2 -- 20 points

The work and/or environment regularly requires constant alertness, knowledge of special safety precautions, occupational or procedural training, and--in some instances--protective clothing or gear to prevent, control, eliminate, or reduce the effects of moderate risks, discomforts, exposure to dangerous substances (e.g., chemical, biological, or radiological), or adverse environmental conditions, such as:

- intermittent periods of loud noises; and/or
- periods of uncomfortable temperature, altitude, wind, or humidity (simulated or real); and/or
- bad weather; and/or

- work located in the vicinity of, but not in close proximity to munitions testing; and/or
- work where moving parts, operating engines, weapons, or machines, or moving vehicles, craft, and test items pose limited, moderate danger; and/or
- nonlethal chemicals, smoke, fumes, or other irritants.

The engineer or scientist typically must sometimes wear or use sound suppressors, hard hats, goggles, foul weather gear, or similar protective clothing and equipment.

Level 9-3 -- 50 points

The work and/or environment requires knowledge and skill in the use of extensive safety, occupational, and procedural precautions to control, reduce, eliminate, or prevent possible adverse effects from unusual environmental stress or potentially dangerous conditions, situations, or exposures, such as:

- repeated, protracted exposure to dangerously loud noises; and/or
- work with or near volatile fuels, high pressure gases, pyrotechnic explosives, or other potentially disabling or lethal chemicals, bacteria, viruses, radiation sources, and/or
- work on active test and duty runways, decks, towers, or test sites near fast moving vehicles, craft or dangerous machinery, or during high wind conditions.

The engineer may be required to use a wide range of protective, defensive, or monitoring gear. Some gear may be extremely uncomfortable to use or wear.

APPENDIX OPTIONAL GRADE EVALUATION FORMAT

AGENCY PD#: _____ TITLE & SERIES: _____

AGENCY: _____

LOCATION: _____

Agency or Bureau HQ Major Command Regional HQ Field Other (Please Specify):

FES	FACTOR	LEVEL	POINTS	COMMENTS
1	Knowledge Required			
2	Supervisory Controls			
3	Guidelines			
4	Complexity			
5	Scope and Effect			
6/7	Personal Contacts and Purpose of Contacts			
8	Physical Demands			
9	Work Environment			
		TOTAL:		= GRADE:

GRADE CONVERSION CHART

POINT RANGE	GRADE
1855-2100	GS-09
2105-2350	GS-10
2355-2750	GS-11
2755-3150	GS-12
3155-3600	GS-13
3605-4050	GS-14
4055 & HIGHER	GS-15

CLASSIFIER: _____ DATE: _____

TITLE: _____