Federal Wage System Job Grading Standard for Boiler Plant Operating, 5402

Table of Contents

WORK COVERED

This standard is for use in grading nonsupervisory jobs concerned primarily with the operation and operational maintenance of single and multiple fuel water or fire tube boilers and associated auxiliary and pollution control equipment. These boilers operate at various pressures and temperatures in automatic or manual modes to produce steam or high temperature hot water to provide heat for buildings, to operate industrial and institutional facilities and equipment, and to generate electricity.

WORK NOT COVERED

This standard does not cover work that primarily involves:

- Operation of two or more utility systems such as a boiler plant, water treatment, or sewage disposal facilities when no single skill or knowledge of a single utility is predominant or grade controlling. (See Job Grading Standard for Utility Systems Operating, 5406.)

- Control of the generation or distribution of electrical power. (See Job Grading Standard for Electric Power Controlling, 5407.)

- Operation of industrial or medical type incinerators to burn trash or medical waste. (See Incinerator Operating Series, 5403.)

- Operation and repair of one or more utility systems such as heating, air conditioning, or sewage treatment facilities when the levels of work associated with utility repair and operation are at the same grade level. (See Job Grading Standard for Utility Systems Repairing-Operating, 4742.)

- Installation, maintenance, repair, and modification of steam or hot water boilers. (See Job Grading Standard for Heating and Boiler Plant Equipment Mechanic, 5309.)

TITLES

Jobs covered by this standard above grade 8 are titled *Boiler Plant Operator*.

Jobs covered by this standard at the grade 8 level and below (other than Helper and Intermediate Jobs) are titled *Boiler Plant Worker*.

GRADE LEVELS

This standard does not describe all possible levels at which jobs may be established. If jobs differ substantially from the skill, knowledge, or other work requirements of the grade levels described in this standard, they may warrant grading either above or below these grades based on the application of sound job grading methods.

HELPER AND INTERMEDIATE JOBS

Helper jobs are graded by the Office of Personnel Management Job Grading Standard for Trades Helper Jobs. The grade 8 level described in this standard does not apply to jobs that are part of a planned program of training and development of skills for advancement to a higher grade. Such trainee jobs are covered by the Office of Personnel Management Job Grading Standard for Intermediate Jobs. Work evaluated at grade 9 and above, as appropriate, is to be used as the Ajourney level@ in applying the Intermediate Job Grading Table.

NOTES TO USERS

Ongoing technological advancements in the areas of electronic industrial controls and computerization of boiler facilities have had and will continue to have an impact on Federal facilities generating steam or high temperature hot water. As a consequence, work within this occupation, in certain work situations, may require familiarity or working knowledge of electronic controls and computerized control equipment.

When evaluating complexity of work within this occupation, classifiers and other users of the standard should not determine grade levels by evaluation of the complexity of the computerized control systems, the criticality of the function or mission being serviced, or the generating capability of the facility. Grade levels can only be determined through an accurate evaluation of actual work performed and the corresponding skills and knowledge necessary to accomplish the required work.

The grade 10 level described in this standard is based on specific types of boiler operations (i.e., fuels burned) and the corresponding levels of skill, knowledge, and responsibility necessary to operate boilers and associated pollution control equipment efficiently and control the formation of pollutants.

DEFINITION OF TERMS

For the purpose of this standard, boilers are defined in accordance with criteria established by the American Society of Mechanical Engineers. The following definitions are operational parameters. They do not imply functional usage.

Heating Boiler. A boiler designed for operation at pressures not exceeding fifteen pounds per square inch (15 psi) for steam, or at pressures not exceeding one hundred sixty pounds per square inch (160 psi) and temperatures not exceeding two hundred fifty degrees Fahrenheit (250 degree F) for water.

Power Boiler. A boiler designed for operation in which steam or other vapors are generated at pressures exceeding fifteen pounds per square inch (15 psi), or a boiler used for heating water or liquid to a pressure exceeding one hundred sixty pounds per square inch (160 psi) and at temperatures exceeding two hundred fifty degrees Fahrenheit (250 degree F).

SPECIAL ADDITIONAL RESPONSIBILITIES

This section provides guidance for determining the grade level of certain plant operating situations. The Boiler Plant Operator standard describes normal operation. However, employees in certain plant operations work under special circumstances. When positions are clearly working under the circumstances described below, one additional grade may be credited to plant operator positions at the full performance level, whether they work alone or with a small group of plant operating employees. Typically only one boiler plant operator on each shift would be credited with an additional grade for shift level responsibility. (See Digest Vol. 13 for additional guidance on crediting of shift responsibilities.)

Most boiler plants run on a 7-day, 3-shift plan. Operators may be assigned to a specific shift or alternate, working on all three shifts, including weekends. On second and third shifts and on weekends, one operator is typically designated as the "operator in charge" of the complete plant (i.e., the primary steam or hot water generating facility) including ancillary facilities, stand-alone, and satellite boilers which may be geographically dispersed. The "operator in charge" is responsible for following written instructions from a supervisor or the "operator in charge" on the previous shift. The "operator in charge" typically performs additional duties which are more responsible and require a slightly higher level of skill and knowledge than full performance level operators with a supervisor available to provide specific guidance and assistance.

The "operator in charge" must have a thorough knowledge of the entire steam or hot water system and user requirements in order to locate problems and initiate immediate corrective action to maintain adequate steam or hot water production. The operator, in the absence of written contingency procedures, has the responsibility to decide whether to shut down a boiler and, if so, whether equipment still in operation can handle the load or whether to fire up another boiler and attempt to bypass the trouble until corrective action has been completed. Typically, the "operator in charge" has responsibility to determine what work must be done and has the authority to approve overtime or to call in "off-duty" maintenance personnel. The operator is responsible for relaying instructions to the next shift operator, including problems encountered and action taken.

While these and other similar situations do not describe supervisory responsibilities, they represent situations which indicate that individuals designated as "operator in charge" have more

responsibility and a higher level of skill and knowledge than operators who have a supervisor available for technical advice and guidance.

An additional grade should be added only to plant operators at the full performance level who are assigned shift responsibility on a regular and recurring basis. Credit should not be given to plant operators who regularly work when a supervisor is present or at a nearby facility on the same shift. It is the intent of this provision that only one operator on each shift be credited with an additional grade for shift level responsibility.

BOILER PLANT WORKER, GRADE 8

General: Grade 8 boiler plant workers assist in the operation and operational maintenance of gas, refuse derived fuel, wood, oil, and coal fired power boilers and auxiliary equipment with manual or automatic controls to produce saturated or superheated steam or high temperature hot water. Under the direction of a boiler plant operator, they light off, operate, secure, and maintain power boilers and associated auxiliary and pollution control equipment. They operate dampers, induced and forced draft fans, bottom and fly ash removal equipment, heat exchangers, fuel and air heaters, pumps, fuel pressure control valves, fuel strainers, relief valves, water softeners, and other similar equipment. They regulate fuel feed and water levels and maintain required steam pressure or temperatures. They check flame for correct color and shape and make adjustments for proper combustion. They check feed water regulators, flowmeters, flue gas temperature, various gauges, stack emissions, fuel feed or conveyor equipment, water level indicators, relief and fuel pressure control valves, and safety equipment to determine if boilers are operating within prescribed limits. They change burner tips as required due to different fuels or firing rates, operate soot blowers to clean fireside tube walls, and blow down water columns to verify that there are no false water level indications. They perform a variety of standard chemical tests on boiler and feed water. They also treat waste water prior to discharge.

They replenish chemical feed tanks and monitor feed water conditioning equipment to control or remove impurities and entrapped gases. Grade 8 workers make periodic checks of all equipment and visually and physically check meters, shafts, bearings, motors, belts, turbine and electric pumps, etc., to assure proper operations. They perform routine preventive maintenance and minor operational repairs such as greasing and oiling moving parts of machinery, adjusting packing glands, repacking valves, and cleaning burner tips, nozzles, air filters, grates, and oil strainers, and replacing gauge glasses and other similar types of equipment. They also clean and paint equipment, pipes, etc., as necessary. Workers at this level assist boiler plant operators in more difficult repairs and maintenance. During shut down periods they assist in equipment overhaul and preparation of boilers for inspection.

In addition to the above, some boiler plant workers tend several gas, coal, or oil fired heating or power boilers with automatic controls at several different locations. They independently start, adjust, maintain, and periodically monitor water level, fuel feed, pressure, and other gauges to assure efficient operation. Boilers operated under these conditions are designed to operate without constant attention. (Note - Work which primarily involves tending boilers as described above should be evaluated at a lower grade level.)

Skill and Knowledge: Grade 8 boiler plant workers require a working knowledge of the structure and operating characteristics of boilers and associated auxiliary equipment. They know the location and function of numerous pumps, valves, regulators, gauges, recording instruments, controls, power operated dampers, conveyors, and other equipment associated with clean, safe, and efficient boiler operation. They have knowledge of fuel handling and distribution equipment and systems, fuel firing mechanisms, feedwater treatment systems, electrostatic precipitators, flue gas scrubbers, and lime slurry systems. They have a basic knowledge of the chemical and physical characteristics of fuels and principles of combustion, steam generation, and heat transfer. They have a working knowledge of the relationship between fuel quality and efficient combustion characteristics. They have a working knowledge of water tending, analysis, and basic chemical treatments. They have a general understanding of the individual and combined effects of chemical additives.

They are knowledgeable of basic operations necessary in start-up, shutdown, and restart procedures and in casualty control. They have skill in adjusting various conditions such as air temperature, draft, and other furnace conditions. They have skill in interpretation of meter and gauge readings. They are able to recognize malfunctioning equipment and systems and potentially dangerous operating conditions. They have skill in the use of handtools, electric and pneumatic power tools, and specialized tools of the trade. They have skill in applying preventive maintenance procedures and performing limited operational repairs such as cleaning equipment, greasing and oiling moving parts of machinery, repainting equipment, tightening packing bonnets and glands on valves and pumps, repacking valves, replacing pumps, and assisting higher grade workers in more difficult repairs and replacements.

Responsibility: Grade 8 boiler plant workers receive work assignments from a supervisor or a higher grade worker in the form of written or oral instructions. The instructions outline the work to be performed and the methods and materials to be used. Workers at this level are responsible for observing meters and gauges to insure proper combustion and prescribed temperatures, pressures, and emissions and for performing routine operator maintenance of equipment. They are responsible for understanding and responding to a variety of conditions indicated by meters and gauges. Workers are alert and recognize dangerous conditions in boilers, controls, valves, piping and other equipment inherent to boiler operations to prevent equipment damage or explosion. They are responsible for performing work in accordance with local, state, and Federal pollution control requirements. Problems are reported to a higher grade worker or supervisor. Work at this level is checked through observation of work methods and procedures. A higher grade worker or supervisor is available for advice and assistance on any work problem encountered and checks to see that assignments are completed according to instructions and established practices.

Physical Effort: Grade 8 boiler plant workers frequently work in confined areas in and around boilers and support equipment (i.e., auxiliary and pollution control equipment). The work requires moderate to strenuous effort and long periods of walking, standing, climbing, bending, and crouching. Workers frequently lift and carry boiler parts and chemical supplies weighing up to 18 kilograms (40 pounds) unassisted and occasionally items weighing over 18 kilograms (40 pounds) with assistance of other workers or weight handling equipment.

Working Conditions: Grade 8 boiler plant workers work indoors and occasionally work outside for short periods where they are subject to prevailing weather conditions. Workers are subject to high temperatures, constant noise, rotating machinery, soot, dirt, grease, chemicals, oil, and fumes in the work area. Boiler plant workers at this level are subject to cuts and abrasions from the use of tools and equipment and burns from acids, caustics, hot water, steam, and contact with piping and boilers. In addition, they work on catwalks and ladders.

BOILER PLANT OPERATOR, GRADE 10

General: In comparison with grade 8 workers who assist in the operation of boilers and auxiliary equipment, grade 10 boiler plant operators start, operate, adjust, stop, maintain, and perform various operational repairs on single or multiple fuel power boilers and associated auxiliary and pollution control equipment. Boilers operated at this level are fired by coal, oil, refuse derived fuel (RDF), wood, or a combination of these fuels to produce steam or high temperature hot water required to meet changing load demands. Boilers operated at this level require constant attention to maintain efficiency and control the formation of pollutants. Grade 10 operators maintain efficient combustion levels and ensure compliance with air pollution laws or regulations. Through the use of manual, automatic, or microprocessor controls or control systems, boiler plant operators monitor, adjust, and control all phases of boiler plant operations.

They use electronic, hydraulic, and pneumatic controls, and zone charts in conjunction with meters, gauges, and computer generated data to determine adjustments or corrections necessary for proper boiler operations or changing load requirements. They operate, adjust, and maintain auxiliary and pollution control equipment such as electrical or steam driven pumps, forced and induced draft fans, air compressors, deaerating equipment, feed water heaters, coal pulverizers, automatic stokers, economizers, fuel heaters and delivery equipment, demineralizing systems, electrostatic precipitators, and lime slurry systems. They adjust fuel feeds and the volume and velocity of draft and other fire box variables to achieve maximum combustion efficiency with changing load demands or variations in fuel quality. They regularly observe and note readings on gauges, meters, detectors, recorders, boiler water level indicators, and computer generated and analog displays to detect danger signals in operations.

They analyze or direct lower grade workers to test feedwater, boiler water, and condensate using standard chemical tests. They determine the treatment and chemicals to be used to control chemical concentrations, remove impurities and entrapped gases, or stabilize fluctuating water conditions in the boiler. In some work situations, due to operating pressures or user requirements, they are required to maintain precise control over the quality or purity of steam produced. They check the operation of safety equipment such as flame extinction, automatic reignition, low water cut-outs, high pressure cut-outs, and purge type combustion safeties. They perform operational maintenance (e.g., lubricate equipment and power clean water tubes) and repairs of limited to moderate complexity (e.g., replace or repair valves, gauges, and pumps) on mechanical parts and systems and may be required to perform limited or basic electrical repairs. They may operate emergency electrical generators to meet plant electrical requirements when the main electrical source is unable to provide the necessary power. In some facilities with cogeneration capabilities, they may work in conjunction with electric power controllers in

starting and stopping steam generating units and auxiliary electrical equipment in accordance with electrical load requirements.

Skill and Knowledge: Grade 10 boiler plant operators apply a comprehensive knowledge of all operational phases of power boiler plant operations (e.g., water treatment, fuel systems, steam generation, and pollution control) and their interrelationships for efficient and economical generation of steam or high temperature hot water (HTHW). They apply knowledge of the principles and theories pertaining to combustion, heat transfer, and steam or HTHW generation in the operation of power boiler plants. In addition, they apply a thorough knowledge of the structural and operating characteristics of single and multiple fuel power boilers and associated auxiliary and pollution control equipment or systems (e.g., computerized or microprocessor control systems, fuel handling and distribution equipment and systems, fuel firing mechanisms, feedwater and boiler water treatment systems, steam and electrical pumps, pressurization systems, compressors, electrostatic precipitators, and flue-gas desulfurization systems) to properly operate, adjust, troubleshoot, and maintain the equipment and systems. They apply a thorough knowledge of water treatment procedures and water analysis, using standard chemical tests. They have a thorough knowledge of water treatment equipment and systems (e.g., cation/anion exchange units for demineralization of feedwater). They have a thorough knowledge of chemical and physical aspects of sulfur-containing fuels (e.g., oil, coal, and lignite), the chemical reactions involved in combustion, and the relationship between fuel quality and combustion efficiency. They have a practical knowledge of environmental law and a thorough knowledge of procedures or adjustments during combustion to control pollutants in flue emissions (e.g., control combustion time, stack temperature, and excess air flow). They have a thorough knowledge of the steam or HTHW distribution systems, user requirements, casualty control procedures, and how to bypass a section of the stem to maintain service. They are knowledgeable of maintenance requirements (e.g., cleaning fuel guns, lubricating equipment, and power cleaning water tubes) and procedures necessary to perform operational repairs of limited to moderate complexity (e.g., repair or replace valves, gauges, water pipes, and refractory linings). In some work situations, operators at this level may have basic knowledge of electricity to test and replace wires, switches, and other basic electrical components.

Boiler plant operators at this level have skill in procedures and adjustments necessary to start, operate, and maintain a power boiler facility (i.e., power boilers and auxiliary and pollution control equipment) to meet load demands and maintain efficient levels of combustion and compliance with pollution laws. They have skill in operating power boilers from cold starts through normal operation and hot or emergency shut downs. They can stabilize boilers in a closed system when one boiler starts to go down while maintaining safe levels and efficient combustion. They have skill in the operation and adjustment of associated auxiliary and pollution control equipment. They have skill in reading and analyzing information from gauges, meters, recorders, analog displays, and computer generated data to determine the operational status of the facility and necessary adjustments. They can make individual and sequential adjustments to a variety of controls and equipment to achieve and maintain maximum efficiency of equipment and systems being operated. They are skilled in specialized combustion techniques and adjustments to firebox variables such as fuel flow or feed, fuel/air ratio, temperature, combustion time, and over air or under air feeds to control chemical pollution in flue gas emissions and maintain combustion efficiency. They apply skill in setting and adjusting flame

patterns in power boilers with single or multiple burners to ensure safe and efficient combustion. They have skill in adjusting various combustion settings to compensate for varying qualities or conditions of fuels.

Responsibility: Grade 10 boiler plant operators receive work assignments from a supervisor or a higher grade operator who is in charge of the facility or work shift. They provide written or oral instructions which may be accompanied by diagrams, drawings, operating manuals, or special facility procedures to be followed during emergencies, equipment failure, or system malfunction. They are familiar with the total plant layout including drawings and circuit diagrams of the boilers and auxiliary and pollution control equipment, in order to locate problems and determine appropriate action necessary to maintain adequate steam or high temperature, hot water production. As compared to the predetermined methods and procedures at the grade 8 level, grade 10 boiler plant operators make more independent decisions and judgments regarding boiler plant operations (e.g., combustion and pollution control adjustments, troubleshooting techniques, and equipment maintenance and repair procedures). In maintenance and repair operations, they complete all work in accordance with required specifications and use a variety of standard mechanical and basic electrical processes. Boiler plant operators at this level typically have primary responsibility for checking boilers and auxiliary and pollution control equipment to insure the operational efficiency of equipment and safety of personnel. They take immediate action to prevent interruptions to plant operations and report all emergencies or dangerous conditions. The supervisor or a higher grade operator with shift level responsibility is usually available to provide technical assistance on difficult or unusual problems. Work is checked through occasional observation of operational efficiency, production reports, and adherence to established operating techniques and procedures.

Physical Effort: Physical effort is the same as that described at the grade 8 level.

Working Conditions: Working conditions at this grade level are the same as those described at the grade 8 level.