

Federal Wage System Job Grading Standard for Heating and Boiler Plant Equipment Mechanic, 5309

Table of Contents

WORK COVERED	2
WORK NOT COVERED.....	2
TITLES	2
GRADE LEVELS	3
HELPER AND INTERMEDIATE JOBS	3
NOTE TO USERS.....	3
HEATING EQUIPMENT REPAIRER, GRADE 8	4
BOILER PLANT EQUIPMENT MECHANIC, GRADE 10.....	6

WORK COVERED

This standard is for use in grading nonsupervisory jobs involved in installing, maintaining, repairing, troubleshooting, and modifying single and multiple fuel heating and power boilers and associated auxiliary and pollution control equipment, hot air furnaces, and similar equipment systems. The systems and equipment provide steam, heat, or hot water for use in the operation of industrial and institutional facilities and equipment. This work requires knowledge of the principles of combustion, heat transfer, and steam and high temperature hot water generation. It also requires the ability to recognize and determine the best method for correcting malfunctions and the skill to install and repair a variety of heat and power producing systems and support equipment.

WORK NOT COVERED

The standard does not cover work that primarily involves:

- Operating and monitoring single or multiple fuel power boilers and associated auxiliary and pollution control equipment. (See [Job Grading Standard for Boiler Plant Operating, 5402.](#))
- Repairing, testing, and calibrating automated controls and instruments for power boilers and associated auxiliary and pollution control equipment. (See [Job Grading Standard for Instrument Mechanic, 3359.](#))
- Installing, maintaining, troubleshooting, repairing, and calibrating electronic controls and recording and indicating systems used on industrial machinery and equipment and energy monitoring and control systems. (See [Job Grading Standard for Electronic Industrial Controls Mechanic, 2606.](#))
- Installing, maintaining, troubleshooting, and repairing electronic equipment such as specialized industrial systems requiring knowledge of the practical application of electronic principles. (See [Job Grading Standard for Electronics Mechanic, 2604.](#))
- Repairing, modifying, and maintaining equipment and systems involved in climate control by means of mechanical compression or absorption to provide air conditioning. (See [Job Grading Standard for Air Conditioning Equipment Mechanic, 5306.](#))

TITLES

Jobs covered by this standard that involve repairing and maintaining heating equipment as described in this standard below grade 10 are titled *Heating Equipment Repairer*.

Jobs that involve replacing, repairing, and maintaining boiler plant equipment such as that described at grade 10 and above are titled *Boiler Plant Equipment Mechanic*.

GRADE LEVELS

This standard describes two levels of nonsupervisory work at grades 8 and 10. It does not describe all possible grades at which jobs may be established. If jobs differ substantially from the levels of skill, knowledge, and other work requirements described for the grade levels in this standard, they may be graded either above or below these grades based on sound job grading methods.

HELPER AND INTERMEDIATE JOBS

Helper jobs are graded by the U.S. 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 for advancement to a higher grade. Such trainee jobs are covered by the U.S. Office of Personnel Management's [Job Grading Standard for Intermediate Jobs](#). Grade 10 in this standard is to be used as the Journey level in applying the Intermediate Job Grading Table.

NOTE TO USERS

Ongoing technological advancement 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 at the full performance level may require familiarity or a basic knowledge of electronic controls and computerized control equipment.

Definition of Terms

For the purpose of this standard, boilers are defined in accordance with criteria established by the American Society of Mechanical Engineers.

- **Heating Boiler.** A boiler designed for operation at pressures not exceeding 6.9 kilograms per 6.4 square centimeters (15 psi) for steam, or at pressures not exceeding 72 kilograms per 6.75 square centimeters (160 psi) and temperatures not exceeding one hundred and twenty-two degrees Celsius (250° Fahrenheit) for water.
- **Power Boiler.** A boiler designed for operation in which steam or other vapors are generated at pressures exceeding 6.9 kilograms per 6.4 square centimeters (15 psi), or a boiler used for heating water or liquid to a pressure exceeding 72 kilograms per 6.75 square centimeters (160 psi) and at temperatures exceeding one hundred twenty-two degrees Celsius (250° Fahrenheit).

HEATING EQUIPMENT REPAIRER, GRADE 8

General: Grade 8 heating equipment repairers install, repair, and maintain a variety of domestic heating equipment and systems such as oil fueled heaters, hot air furnaces, heating boilers, and other systems and equipment with similar heat sources, controls, and circulating methods. The heating equipment and systems maintained at this level are usually uncomplicated and do not have complex maintenance requirements. They are typically located in administrative offices, shops, warehouses, dormitories, residential housing, and motor pools. Assignments include replacing defective burners, switches, fuel lines, cutoff assemblies, and examining and adjusting thermostats, repairing or replacing motors, blowers, pilots and ignitors, and other heating related equipment; maintaining electrical, pneumatic, and mechanical controls; identifying electronic control problems; and making repairs to refractory liners in heating boilers. They visually examine and operationally test electric, electronic, pneumatic, and mechanical systems and equipment using specialized test equipment. In addition to performing routine preventive maintenance including removing, replacing, and repairing defective components, grade 8 repairers adjust equipment controls such as temperature sensors, thermostats, and leak detectors.

In some work situations, they may assist boiler plant mechanics in installing, modifying, repairing, testing, and maintaining equipment such as power boilers and associated auxiliary and pollution control equipment. They repair, replace, and maintain bearings, oil seals, pilots, burners, valves, and electro-mechanical controls and other items of similar complexity. They assist mechanics in the installation of new plant equipment including boilers, furnaces, pumps, and controls.

Skill and Knowledge: Grade 8 repairers have a working knowledge of the standard methods of combustion, heat transfer principles, and fuel characteristics to install, repair, and maintain heating boilers and domestic heating units and systems. They have knowledge of heating surfaces, combustion chambers, and the various heat circulating methods, and have a working knowledge of pneumatics, electricity, and basic electronics to locate faults in temperature controls and control devices such as damper motors, mixing valves, and modulating motors. They are familiar with the construction and operating characteristics of the heating systems so that they can install, adjust, repair, or replace components, control devices, and units. They have skill in determining the condition of system parts and components to make repairs or replacements. Grade 8 repairers use technical manuals, manufacturers' manuals, and special instructions to determine whether replacement, service, or repair of key parts or components of the heating system is required. They have skill in installing, aligning, adjusting, and repairing oil, gas, and coal burners and other burning mechanisms as well as heating boiler components located in structures such as dormitories, recreation facilities, residential housing, and remote buildings requiring individual heating systems. They use shop mathematics to compute fuel consumption rates, heat generating units, and air to fuel ratios and conversions. When working in boiler plant facilities, they may perform refractory maintenance including repairs of internal boiler lining using brick and castable materials. They use standard and specialized hand and power tools common to the trade such as adjustable wrenches, pneumatic hammers, pipe cutting equipment, and drill presses.

They have skill in the use of precision measuring devices such as calipers and micrometers, and they have a general knowledge of pipe fitting techniques and rigging setups for movement of large heating plant components. Repairers at this grade level have skill to perform routine maintenance on small electric motors, feed pumps, and valves, including replacing brushes, seals, and bearings, and repacking valves.

Responsibility: Grade 8 heating equipment repairers work under the general supervision of a higher grade worker or supervisor and receive assignments orally or through work orders and instructions which may include blueprints, sketches, engineering drawings, or other written specifications. Grade 8 repairers determine the sequence of work, the general methods and techniques, the tools required, and complete assignments with limited supervision. They determine the condition of the equipment serviced and decide when to replace or repair worn or damaged items. They are responsible for maintaining heating equipment which is in compliance with technical and safety specifications and environmental requirements. Work is subject to spot checks while in progress and upon completion for compliance with instructions and technical requirements.

Physical Effort: Grade 8 heating equipment repairers work in tiring or uncomfortable positions for long periods. The work requires frequent standing, bending, crouching, kneeling, and climbing. They occasionally work from scaffolds and platforms and may perform strenuous work while standing, sitting, or lying. They frequently lift and carry tools and equipment weighing up to 23 kilograms (50 pounds) and occasionally items weighing more with assistance of material lifting devices or other workers.

Working Conditions: The work is usually performed indoors on concrete surfaces where there is exposure to dust, dirt, chemicals, heat, steam, noise, and unpleasant odors. Repairers occasionally service equipment outdoors under adverse weather conditions. They are continually exposed to the potential for burns, electrical shocks, cuts, strains, bruises, and chemical irritations. To reduce dangers from these and other similar conditions, they follow prescribed safety practices and use safety equipment such as safety glasses, hard-toe shoes, respirators, hardhats, and fire retardant gloves.

BOILER PLANT EQUIPMENT MECHANIC, GRADE 10

General: In comparison with grade 8 repairers who install, repair, and maintain heating boilers and/or domestic heating systems and equipment, grade 10 boiler plant equipment mechanics install, maintain, and repair a variety of complex equipment and systems involving power boilers with complicated components, critical requirements, and rigid tolerances. They repair, troubleshoot, and maintain single-and-multiple fuel power boilers and associated auxiliary and pollution control equipment such as water treatment systems, chemical dispensers, electrostatic precipitators, bag houses and ash removal equipment, and wet particulate scrubbers. Power boilers use oil, gas, coal, wood, refuse derived fuel (RDF), tire chips, or combination fuels in steam or hot water production and distribution plants. Power boilers serviced at this level typically include a variety of auxiliary components such as fuel delivery systems, induced draft fans, conveyor belts, preheaters, coal pulverizers, worm screw feeders, moving floors, de-aerating equipment, water treatment equipment, economizers, and air compressors that often require regular adjustment and maintenance to meet rigid tolerances.

Grade 10 mechanics monitor and test the operation of power boiler systems in order to identify malfunctions and potential problems with equipment such as automatic controls, valves, bag houses, electrostatic precipitators, lime slurry systems, fly ash recovery systems, piping, pumps, and related components. They examine, adjust, and as necessary, replace and repair equipment such as pneumatic and electrical thermostats, governors, regulators, switches, fuel cutoff devices, burners, fuel feed and flame safeguard controls, steam gland seals, bearings, and drive gears. They maintain burners, burner nozzles, and orifice assemblies, and dismantle and locate defects and reassemble and reinstall components. They service units by cleaning or replacing filters, strainers, orifices, ignition devices, and other items on power boilers. By comparison with the grade 8 level repairers, who typically service and repair heating boilers and other heating systems, such as domestic heaters, the grade 10 mechanic maintains, repairs, and troubleshoots power boilers and their components using specialized test equipment.

Grade 10 boiler plant equipment mechanics perform preventative and scheduled maintenance on plant systems and equipment including boiler feed pumps, fuel oil pumps, air compressors, turbines, generators, boiler fixtures, and combustion fans. They balance, align, and maintain turbines, pumps, generators, compressors, and maintain ash shredding equipment and preheaters. They repair or replace flame gauges, controls, relief valves, and ignition devices. Mechanics at the grade 10 level troubleshoot electrical and pneumatic controls. They adjust and perform limited diagnostic checks on electronic control devices to determine sources of malfunctions of power boilers. In some work situations, grade 10 level mechanics maintain and rework remote heating boilers and perform major overhauls of the entire system including the repair, replacement, and installation of boiler tubes, refractory linings, electronic and electrical controls, and associated components. They may work with complex burner management controls and examine electronic and electro-mechanical controls and support equipment for power boilers using infrared, ultra-violet, and related testing devices.

Skill and Knowledge: Grade 10 boiler plant equipment mechanics have a thorough knowledge of mechanical, electromechanical, and pneumatic principles and a working knowledge of electronics to repair and maintain power boilers and associated auxiliary and pollution control equipment. They have a thorough knowledge of automatic and semi-automatic boiler management systems that use manual, electric, electronic, pneumatic, and mechanical controls. They have skill to troubleshoot, maintain, repair, and replace defective equipment and components in power plants and heating systems. Grade 10 work requires more skill and knowledge than work at the grade 8 level since the equipment, components and controls are more complex and difficult to troubleshoot, repair, and maintain in the boiler plant systems. Work at this level typically requires a working knowledge of electronic controls and devices to identify equipment malfunctions, assess repair requirements, and replace or coordinate repairs for state-of-the-art control systems such as microprocessors and other solid state devices. The grade 10 mechanic has skill in making major repairs to pollution control equipment such as bag houses and electrostatic precipitators. They have skill to repair, install, connect, and adjust motors, relays, solenoids, switches, safety devices, thermostats, rheostats, aquastats, and other similar devices. They have skill to maintain, repair, and adjust hydraulic cylinders, speed governors, safety valves, feed water pumps, fuel lines, coal pulverizers, combustion fans, air compressors, and coal and ash handling equipment. Grade 10 mechanics have skill in the use of stationary and industrial type power equipment such as power saws, lathes, and grinders to repair or install equipment. They use test equipment such as pyrometers, ohmmeters, and flow meters to identify defects, repairs needed, or preventive maintenance required.

Responsibility: Grade 10 boiler plant equipment mechanics make more complex technical decisions and judgments than repairers at grade 8 since work at this level is performed on the most complex boiler systems and subsystems with limited technical guidance. Grade 10 level mechanics receive work assignments from a supervisor in the form of written or oral instructions which may include schematics, diagrams, drawings, or technical manuals. They generally accomplish work assignments with minimal supervision. They use judgment to plan equipment repairs and determine maintenance requirements. They are responsible for assuring that all safety procedures and environmental control safeguards are followed when working near hot surfaces, chemical compounds, or moving machinery. Their completed work is reviewed by the supervisor for adherence to established practices, outlined objectives, and technical requirements.

Physical Effort: Physical effort is the same as that described at the [grade 8 level](#).

Working Conditions: Working conditions are the same as those described at the [grade 8 level](#).