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**Federal Wage System
Job Grading Standards**



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**FEDERAL WAGE SYSTEM
JOB GRADING
STANDARD
FOR
BOILERMAKING,
3808**



**Workforce Compensation
and Performance Service**



BOILERMAKING, 3808

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WORK COVERED

This standard is to be used to grade nonsupervisory jobs involved in the modification, fabrication, repair, assembly, and installation of boilers, tanks, condensers, uptakes, stacks, other pressure vessels, and similar structures of heavy-gauge metal plate.

WORK NOT COVERED

This standard does not cover:

- Jobs that involve the fabrication and repair of sheet metal parts, items, and assemblies. (See [Job Grading Standard for Sheet Metal Mechanic, 3806.](#))
- Jobs that involve modification, fabrication, repair, assembly, and installation of other metal structural parts of ships and other vessels. (See [Job Grading Standard for Shipfitting, 3820.](#))
- Jobs that involve primarily the installation, maintenance, and repair of heating systems (which include boilers), heaters and furnace. (See [Job Grading Standard for Heating and Boiler Plant Equipment Mechanic, 5309.](#))

TITLES

Jobs covered by this standard at grade 10 and above are to be titled *Boilermaker*.

Jobs with limited assignments below grade 10 are to be titled *Boilermaking Worker*.

GRADE LEVELS

This standard describes only grade level 10. If jobs differ substantially from the level of skill, knowledge, and other work requirements described in this standard, they may be graded above or below this level based on the application of sound job grading methods.

HELPER AND INTERMEDIATE JOBS

Helper and intermediate boilermaking jobs are covered by the [Job Grading Standards for Trades Helper](#) and [Intermediate Jobs](#). (Grade 10 in this standard is to be used as the "journey level" in applying the Intermediate Job Grading Standard.)

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General: Grade 10 boilermakers modify, fabricate, repair, assemble, install, rip out, and test condensers, high pressure boilers and associated components in stationary power plants and on ships such as submarines, destroyers, and aircraft carriers. Equipment includes main propulsion boilers, auxiliary and heating boilers, stationary power plant boilers, supercharged steam generators, nuclear steam generators, and tanks. Work is performed both aboard ships and ashore. To devise and calculate a pattern for these kinds of items, the grade 10 mechanics occasionally apply principles of radial line development combined with parallel-line development.

Grade 10 Boilermakers typically:

- Work from blueprints, specifications, mold loft templates, and job orders to lay out parts to be fabricated from heavy metal. When necessary, make forms, jigs, templates, and patterns.
- Employ both hot and cold working methods to bend, roll, flange, cut, and otherwise shape parts of heavy metal to form boilers, tanks, uptakes, stacks, etc., using various shop machinery such as rolls, presses, bending brakes, shears, punches, and hand tools.
- Remove boiler tubes for examination: Split, clean, examine, and evaluate tube condition and report on results.
- Cut, bend, roll, and shape boiler and condenser tubes. Connect tubes in proper assemblies to steam drums, receiver drums, headers, and other parts, expanding tube ends in holes of drums and headers, and assure steamtight fit.
- Remove, repair, and reinstall refractory materials, by ripping out and laying asbestos block, insulating brick, and firebrick and preparing burner openings.
- Repair condenser, boiler casings, boiler tube hole seats, boiler header handhole gasket seating surfaces and counterbores, manway gasket seating surfaces, gages, valves, blowers, meters, burner units, and various other accessories.
- Perform standard tests, such as acid and hydrostatic, on condensers, heat exchangers, boilers and other pressure vessels to locate and repair leaks or defective parts. Connect, align, and operate equipment to boilout new or repair boilers. Clean out boiler scale with acid.

Skill and Knowledge: Grade 10 boilermakers must have knowledge of blueprint reading, mechanical drawing, shop mathematics, geometric and trigonometric principles used in developing and laying out patterns and templates, and knowledge of trade theory, practices, processes, materials, and terms. In addition, grade 10 boilermakers must know how to use

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various metal forming machines required in fabricating, repairing, and installing boiler components, such as gate shear, rotary shear, punch presses, drill presses, bending rolls, bending brakes, do-all saws, and combination punching, shearing, and metering machines, as well as various hand tools.

They must also have knowledge of a variety of test equipment and measuring devices, such as pressure gages, thermometers, depth gages, and micrometers. They occasionally use tools common to other trades, such as welding, machining, forging, and masonry.

Grade 10 boilermakers must possess a high degree of accuracy and skill in developing, laying out, and fabricating their work.

Responsibility: Grade 10 boilermakers usually work alone or as part of a team under general supervision carrying out standard assignments independently and special tasks in accordance with specific instructions. Work is subject to spot check in progress and inspection upon completion. Boilermakers, grade 10, are responsible for determining the kind and quantity of materials required to accomplish the work without undue waste, and the necessary sequences and procedures to follow in order to produce quality work within specified time requirements. They are also responsible for following safety rules and regulations and for the proper and safe operation of tools and equipment.

Physical Effort: Physical strength is required of grade 10 boilermakers: they must often lift and carry 23 kilograms (50 pounds) and sometimes push and pull up to 45 kilograms (100 pounds). Shipboard work involves ascending and descending narrow vertical ladders on ship, often while carrying tools and equipment. Both shipboard and ashore work involves working in cramped and awkward positions, such as kneeling, stooping, and crawling into boiler furnaces and drums through manholes. Physical dexterity to reach, and use hands to check work concealed from view and a high degree of rapid mental and physical coordination are necessary.

Working Conditions: Grade 10 boilermakers work within shops, test laboratories, and aboard ships. The worksites are not protected from elements (heat, cold, rain, etc.). Boilermakers are continuously exposed to such hazardous and unpleasant worksite conditions as: vibration, excessive noise, fumes, acids, flying particles, welding flashes, dust, dirt, and grime; thus, they are vulnerable to damage to eyes and respiratory system, broken bones, cuts, bruises, shocks, and burns. Boilermakers are also exposed to serious injury from slipping and falling from ladders, stacks, or in the drydock. They frequently work in poorly ventilated areas, particularly on board ship. They are occasionally exposed to high degrees of heat from boiler operations and possibility of gas explosion during boiler light-offs.

Various protective devices, including safety shoes, hard hats, coveralls, safety glasses, respirators, face shields, heavy gloves, and ear plugs, are used to minimize these conditions.