

# Federal Wage System Job Grading Standard for Air Conditioning Equipment Mechanic, 5306

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## WORK COVERED

This standard covers nonsupervisory work that is performed to repair and modify a variety of equipment and systems that achieve regulated climatic conditions. This work requires a knowledge of principles of air conditioning, the ability to recognize and determine the best method for correcting malfunctions and the skill to make repairs to a variety of air conditioning and cooling unit systems.

## WORK NOT COVERED

- Work involving the operation of systems and equipment that condition air is not covered by this standard ([Industrial Equipment Operation Family, 5400](#)).
- Work involving repair or modification work on air conditioning systems where one kind of work (e.g., electrical or sheet metal) is performed on a regular and recurring basis and represents the highest skill and qualification requirement is not covered by this standard (e.g., [Electrician, 2805](#) or [Sheet Metal Mechanic, 3806](#)).

## TITLES

Jobs graded by this standard are to be titled *Air Conditioning Equipment Mechanic*.

## GRADE LEVELS

This standard does not describe all possible grade levels for this occupation. If jobs differ substantially from the skill, knowledge, and other work requirements described in the grade levels of the standard, they may be graded above or below these grades based on the application of sound job evaluation principles. The grade levels described in this standard include hazards, physical hardships, and working conditions that are a regular and recurring part of the air conditioning equipment mechanic occupation.

This standard does not provide any additional grade credit for exposure to hazards, physical hardships, and working conditions that may be of an "unusual nature" as defined in Appendix J of [Operating Manual for the Federal Wage System](#).

## HELPER AND INTERMEDIATE JOBS

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

The grade 8 level in this standard covers jobs that involve work on a variety of separate small air conditioning units and pieces of equipment, or on large central systems when major repairs are not involved. The grade 8 level does not describe jobs that are part of a planned program of training and development of skills for advancement to a higher grade; such jobs are covered by the standard for [Intermediate Jobs](#).

### AIR CONDITIONING EQUIPMENT MECHANIC, GRADE 8

*General:* The work at this grade involves installing, recognizing the causes of faulty equipment, and making repairs on a variety of domestic and commercial refrigeration and air conditioning units and systems such as walk-in and reach-in coolers, refrigerators, ice cream cabinets, deep freezers, evaporative coolers, attic and evaporative fans, and other equipment of comparable complexity. The units and systems serviced by grade 8 mechanics are usually located in single or adjoining areas or otherwise designed so that a few testing techniques will locate worn and broken parts, and the repairs are not normally complicated by the need for specialized equipment. The systems are used to condition areas and to cool equipment such as water dispensers, commissary coolers and freezers, kitchen and galley equipment, truck vans, railroad cars, and small structures or areas that use unit comfort coolers, window units and other similar equipment.

Grade 8 mechanics work from oral instructions, blueprints, and work orders. They trace and locate defects to determine the type and extent of repair needed and they plan the work, select the proper tools and testing devices and accomplish repairs according to accepted trade practices.

*Skill and Knowledge:* Grade 8 mechanics use a basic knowledge of the principles and theories of the refrigeration cycle, temperature measurement, the properties of several refrigerants, and the knowledge of the construction and operation of a variety of domestic units and systems. Grade 8 mechanics use a knowledge of the refrigeration cycle of a variety of systems to make visual, audible and mechanical checks for the proper temperature of conditioned spaces; the proper operation of different parts of the refrigeration cycle; proper oil levels; unusual noises; overheated bearings; loose connections; faulty insulation; frayed or loose belts, gaskets and pulleys; and other similar defects.

Grade 8 air conditioning equipment mechanics are skilled in servicing power sources. For example, they tighten connections, make splices, insulate exposed wires, and clean and lubricate moving parts and they test for proper operation and replace items such as belts, fans, and fuses.

Grade 8 mechanics are also skilled in replacing major portions of various cooling units, such as compressors, condensers, expansion valves, float and service valves, thermostats, coils, and drive assemblies.

*Responsibility:* The supervisor assigns work through work orders, blueprints, sketches, and other oral and written instructions. Grade 8 mechanics select their tools, decide on the methods and techniques to use, and complete the work with little check during its progress. They select materials and obtain replacement parts by comparison with the part to be replaced, or by reference to supply lists and manufacturers' catalogs. They test the units or systems upon completion of the repair to insure that the air is conditioned or equipment is repaired according to requirements.

*Physical Effort:* Grade 8 mechanics handle and carry tools, equipment and testing devices that seldom weigh over 23 kilograms (50 pounds). The work is normally performed at sites where most of the equipment can be reached from the floor or from ladders. Occasionally, platforms and scaffolding are needed to reach parts of the systems such as fans, electrical and water lines and duct work. Grade 8 mechanics are occasionally required to stoop, stretch, bend, kneel and work in tiring and uncomfortable positions.

*Working Conditions:* Most of the grade 8 level work is done inside, but the mechanics are frequently subject to sudden temperature changes when working on equipment such as walk-in freezer units. Grade 8 mechanics are occasionally subject to cuts, burns, electrical shocks, and respiratory ailments. Exposure to repeated, prolonged or concentrated amounts of refrigerant gases may cause toxic effects to eyes, skin, and internal organs.

## **AIR CONDITIONING EQUIPMENT MECHANIC, GRADE 10**

*General:* Work at this level involves installing, recognizing the cause of faulty equipment and making repairs on large systems that provide for a variety of air conditioning functions such as heating, cooling, humidifying, dehumidifying, cleaning, filtering, and circulating in comparison with repair work on the equipment described at the grade 8 level.

The systems that grade 10 mechanics install and repair are used to condition the air for different kinds of structures such as warehouses, ships, hangars, hospitals, submarines, and large office buildings and complexes including those with areas that have special requirements such as communication centers, electronic data processing centers, operating rooms, laboratories, clean rooms, link training rooms, and other areas with sensitive equipment. The systems use a variety of methods of air conditioning such as mechanical compression, vapor compression, absorption, steam jet or air cycle.

Grade 10 mechanics work under supervision which is comparable to that described at the grade 8 level of work, but the work is more responsible because assignments include larger projects with more complex problems and with more extensive repairs requiring judgments similar to that described under the responsibility factor at this grade level.

*Skill and Knowledge:* Grade 10 mechanics use a knowledge of the refrigeration cycle of a variety of commercial and industrial systems to locate and check elements such as those which control low side and high side pressure; the temperature of the cooling units; the temperatures of the liquid and suction lines; and the running time of the various mechanisms. They check for the probability of leaks by visual and audible examination of equipment components; by applying prescribed test procedures and equipment; and by exploration of probable reasons for equipment failure. They know principles and theories of air conditioning and refrigeration such as the refrigeration cycle, heat transfer laws, the use of refrigerant tables; how to calculate airflow, and the pressure-temperature characteristics for the different systems in order to locate and repair faulty equipment swiftly and to reduce inoperative time to a minimum. They know how to locate trouble before dismantling, and to make repairs which insure proper functioning after assembly.

Malfunctions of larger, more varied and complex systems are more difficult to locate than those described at the grade 8 level because the controls are more difficult to balance. For example, the systems which grade 10 mechanics know may include those with a variety of compressors such as gear, reciprocating, centrifugal, or rotary pump, and a variety of refrigerant controls such as those with low and high pressure side floats, automatic thermostatic expansion valves, capillary or choke types, and those based on volume or quantity changes. A variety of complicated motor controls are also used such as hermetically sealed motors and pressure controls, thermostatic motor controls (remote and double remote), full and semi-automatic defrosting controls, relays, and other controls to protect against overload or overheating. Various types of power sources are used with various combinations or pulleys, belts, horse power capacity, and tensioners. In comparison with grade 8 mechanics who primarily replace major units and items, grade 10 mechanics use more skills to make more complete repairs. For example, they may dismantle, repair and reassemble units such as pumps, impellers, compressors, chillers, receivers, and evaporators. When making repairs of this nature, they perform more complex repairs such as installing and fitting connecting rods, crank shafts, piston rings, bearings, and bushings; overhauling valves by adjusting or replacing gaskets, springs, floats, diaphragms, valve fittings, seals, and couplings; and aligning motors and flywheel drives.

Grade 10 mechanics use more skill than grade 8 mechanics to install or replace pipes and ducts where the areas to be conditioned are a considerable distance from compressors.

*Responsibility:* The supervisor assigns work orally and through work orders accompanied by building plans, shop sketches, or blueprints. Grade 10 Air Conditioning Equipment Mechanics plan their testing procedures, determine the proper kind and type of parts and equipment they need and install and repair a variety of systems with little or no check during the progress of the assignment. Completed work is checked to insure that it meets accepted practices.

The responsibility is greater at the grade 10 level than at the grade 8 level, because the systems are more complex therefore more difficult to balance. This requires more frequent and more difficult determinations concerning the location of faulty equipment and the kind and type of supplies and repairs needed to repair and balance the systems. Because there is a greater variety of equipment in the more complex systems, repairs are more numerous and complex.

*Physical Effort:* The physical effort is greater at the grade 10 level than at the grade 8 level because the equipment in the system is usually larger and must be maneuvered into and out of specific locations while dismantling and reassembling. Grade 10 mechanics frequently carry and set up parts and equipment that weigh up to 23 kilograms (50 pounds). Hoists, holders, and pulleys are operated when removing units such as large compressors, condensers, and chillers. Grade 10 air conditioning equipment mechanics make repairs and installations from ladders, scaffolding and platforms where the parts of systems worked on are frequently in hard-to-reach places; therefore, stooping, stretching, bending, and kneeling are frequently for longer periods of time than that described at the grade 8 level.

*Working Conditions:* Grade 10 mechanics are subject to the same shop conditions as [grade 8 mechanics](#) but they are occasionally required to work outside, on top of tall buildings, in drafty attic spaces, and in cramped areas with low overheads. Uncomfortable face masks and protective clothing may be occasionally worn when there is a possibility of exposure to toxic refrigerants. The systems are larger at the grade 10 level than at the grade 8 level and refrigerants are used in larger amounts; therefore, grade 10 mechanics are subject to larger amounts of escaping gases when making emergency repairs.

## **AIR CONDITIONING EQUIPMENT MECHANIC, GRADE 11**

*General:* The work at this level involves installing, recognizing the cause of faulty equipment, and repairing, modifying and relocating equipment on various special-purpose air conditioning units and systems that are frequently modified to provide specific and critical climatic conditions in laboratories and other experimental or test activities.

Because grade 11 mechanics modify and balance various elements of systems that are designed to meet a wider variety of extreme and critical conditions, they must apply greater knowledge and skill than described at the grade 10 level.

Assignments are received with fewer and less detailed instructions than at the grade 10 level, usually on a project-to-project basis. In comparison with the type of repair work described at the grade 10 level, judgments and decisions are more frequent and difficult at the grade 11 level because there are fewer technical guides on the kinds of more demanding modification work described below.

*Skill and Knowledge:* At this grade repair and overhaul work requires a knowledge of the construction characteristics of a variety of types and models of systems that are designed to reach and maintain critical and extreme conditions under a variety of circumstances.

The systems are more complex in design and physical layout than those described at the grade 10 level, and the details of construction are more complicated than commercial and industrial systems that are designed to provide a constant set of conditions. Thus, grade 11 mechanics use more skill than grade 10 mechanics to plan and lay out their work to meet a variety of critical requirements. For example, test procedures may call for a motor or engine to be running in a test

chamber during an experiment. In this case, grade 11 mechanics determine the size, shape, and the location of close fitting ducts and install or plan the installation of them so that the heat and exhaust is directed outside the test chamber without affecting the critical conditions. External icing may be a part of the test. In this case icing spray frames are made and installed to direct moisture on critical parts of the equipment which is being tested. Grade 11 mechanics determine the size, shape, and location of the icing spray frames and install or plan the installation of them to meet the conditions of the experiment or test.

Modification work at this level requires greater skill and knowledge than the repair work described at the grade 10 level. For example, components of the systems may be inadequate to produce or react to the conditions needed for a specific test or experiment. In this case, grade 11 mechanics modify, alter, or substitute components and elements of the system in order to meet the specified pressure-temperature characteristics.

*Responsibility:* Grade 11 mechanics receive their assignments with a minimum of accompanying instructions concerning the work methods or the materials to be used. They may work directly with engineering or testing personnel while planning and modifying a system to meet specific conditions.

During the course of the projects, they are expected to do repair and modification to meet conditions which are required by technical personnel.

Their supervisor is available for advice or assistance on very difficult problems but grade 11 mechanics are expected to complete their work without undue interruption to the project. They consult with their supervisor on problems which are unique, or on administrative problems such as the need for additional equipment.

The responsibility is greater at the grade 11 level than at the grade 10 level because more frequent judgments and more difficult decisions are made concerning the kind and type of work that must be done to modify the equipment in a manner that will meet the requirements of specific and critical climatic conditions.

*Physical Effort:* Physical effort at this grade is essentially the same as that described at the [grade 10 level](#).

*Working Conditions:* Working conditions are generally similar to those described at the [grade 10 level](#).