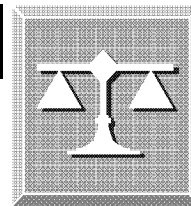


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**Federal Wage System
Job Grading Standards**



WCPS-2 August 2002

**FEDERAL WAGE SYSTEM
JOB GRADING
STANDARD
FOR
PNEUDRAULIC SYSTEMS
MECHANIC,
8255**



**Workforce Compensation
and Performance Service**



PNEUDRAULIC SYSTEMS MECHANIC, 8255

TABLE OF CONTENTS

WORK COVERED	3
WORK NOT COVERED	3
TITLES	4
GRADE LEVELS	4
HELPER AND INTERMEDIATE JOBS	4
PNEUDRAULIC SYSTEMS WORKER, GRADE 7	5
PNEUDRAULIC SYSTEMS MECHANIC, GRADE 9	7
PNEUDRAULIC SYSTEMS MECHANIC, GRADE 10	9
PNEUDRAULIC SYSTEMS MECHANIC, GRADE 11	11

WORK COVERED

This standard covers nonsupervisory work involved in the repair, modification, test, and maintenance of hydraulic and pneumatic systems and components that actuate mechanisms or produce, control, and regulate fluid flow. The work requires knowledge of the physical principles governing the behavior of fluids (liquids and gases) as they pertain to hydraulic and pneumatic systems and components; knowledge of basic electrical and mechanical principles; knowledge of repair procedures, methods, and trade practices; the ability to test for and isolate malfunctions in hydraulic and pneumatic systems or components; and the skill to disassemble, repair, and reassemble such devices.

Mechanics work on many different work units at various times and may rotate from modifying, repairing, and rebuilding to testing and troubleshooting assignments.

WORK NOT COVERED

This standard does not cover work that primarily involves:

- Modification, maintenance, and repair of hydraulic and pneumatic systems or components requiring substantive knowledge of aircraft structures and the relationship of hydraulic/pneudraulic systems to the structure and to other aircraft systems. (See [Job Grading Standard for Aircraft Pneudraulic Systems Mechanic, 8268.](#))
- Repair and modification of a variety of refrigeration and air conditioning equipment and systems that achieve regulated climatic conditions. (See [Job Grading Standard for Air Conditioning Equipment Mechanic, 5306.](#))
- General Mechanical work in making a variety of repairs to powered ground and similar support equipment used for aircraft ground servicing; missile, aircraft, air control, and radar installations' powered support; and general utilities, including standby and emergency power generating systems. (See [Job Grading Standard for Powered Support Systems Mechanic, 5378.](#))
- Repair and modification of hydraulic, pneumatic, and mechanical systems installed in combustion-powered automotive vehicles requiring knowledge of how heavy duty engines, transmissions, and other systems work. (See [Job Grading Standard for Heavy Mobile Equipment Mechanic, 5803](#), or [Automotive Mechanic, 5823.](#))
- Repair and modification of hydraulic, pneumatic, and mechanical systems requiring knowledge of armament equipment and systems such as artillery, missiles, torpedoes, mines, and decoys. (See [Job Grading Standard for Artillery Repairing, 6605](#), [Ordnance Equipment Mechanic, 6641](#), or [Aircraft Ordnance Systems Mechanic, 6652.](#))
- Modification, maintenance, and repair of aircraft engines, engine components, and accessories. (See [Job Grading Standard for Aircraft Engine Mechanic, 8602.](#))



TITLES

Jobs covered by this standard at the grade 9 level and above are to be titled *Pneudraulic Systems Mechanic*.

Jobs covered by this standard below the grade 9 level (other than Helper and Intermediate jobs) are to be titled *Pneudraulic Systems Worker*.

GRADE LEVELS

This standard describes four levels of nonsupervisory pneudraulic systems mechanic work (grades 7, 9, 10, and 11). Depending on the nature of the work performed, grade 9, grade 10, or grade 11 may represent the highest nonsupervisory level or full performance level of pneudraulic systems mechanic work found at a particular work facility.

This standard does not describe all possible grades at which jobs may be established in this occupation, or in any way limit the authority of agencies to assign work or particular duties to positions.

If jobs differ substantially from the levels of skill, knowledge, and other work requirements of the grades described in this standard, they may warrant grading either above or below these grades, based on the application of sound job grading principles.

HELPER AND INTERMEDIATE JOBS

Helper jobs are graded by the Office of Personnel Management [Job Grading Standard for Trades Helper Jobs](#).

The grade 7 level 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](#). (Grade 9 in this standard is to be used as the "journey level" in applying the Intermediate Job Grading Table.)

8255-7 PNEUDRAULIC SYSTEMS WORKER, GRADE 7 8255-7

General: Grade 7 pneudraulic systems workers follow detailed maintenance and repair procedures in performing bench work involving the inspection, repair, and maintenance of parts and subassemblies of hydraulic and pneumatic components. The work is usually repetitive and includes visually inspecting for obvious defects such as scratches, corrosion, or bent or broken parts of subassemblies and less complex assemblies such as oil pumps, coolers, heaters, and simple valves; replacing or removing damaged parts; and performing bench tests for leakage and operability of moving parts. Grade 7 pneudraulic systems workers may assist higher grade pneudraulic systems mechanics on assignments involving hydraulic and pneumatic assemblies and components of greater complexity by disassembling and assembling the simpler items, erecting jigs and fixtures for the final test, and installing safety wires and seals.

Skill and Knowledge: Grade 7 pneudraulic systems workers are skilled in the use of test equipment and measuring devices such as bench test sets, micrometers, torque gauges, multimeters, gauge blocks, and calipers to inspect, disassemble, repair, and test parts and subassemblies of hydraulic, mechanical, and pneumatic assemblies and components. They determine whether to rework or replace parts that exceed allowable wear thresholds based on visual detection of unusual wear patterns or measurements of disassembled parts compared to directly applicable go-no-go specifications. The work requires the ability to use lapping machines, drill presses, grinders, demagnetizers, and other power and handtools to remove imperfections such as scratches and rough edges; and to assemble parts into assemblies and components by shimming, honing, lapping, or selective fitting from groups of like parts.

Grade 7 pneumatic systems workers are knowledgeable of troubleshooting procedures such as soap and water tests designed to isolate malfunctions in uncomplicated assemblies such as fuel valves, regulators, temperature sensors and switches, dampers, and constant flow devices. They are capable of making adjustments during assembly of component parts, involving alignment and clearances where critical tolerance is not a factor. They have the ability to interpret single view blueprints, diagrams, and similar drawings, and to use arithmetic and standard handbook formulae in performing dimensional measurements and maintaining required tolerances. They use a working knowledge of pneumatic, hydraulic, and basic electrical and mechanical principles to repair and test the various subassemblies.

Responsibility: Grade 7 pneudraulic systems workers receive assignments from their immediate supervisor, either orally or through work orders. They work from simple plans, sketches, and detailed specifications and are held responsible for completing work assignments that are usually routine and repetitive by following instructions and accepted trade practices. On new or unusual assignments, the supervisor or a higher graded worker explains in detail the sequence to follow and checks frequently for adherence to instructions.

Physical Effort: Grade 7 pneudraulic systems workers frequently handle objects weighing up to 9 kilograms (20 pounds) and occasionally objects weighing up to 23 kilograms (50 pounds). Hoists, lifts, and other workers are available to assist moving heavier items. They are required to lift, reach, push, pull, bend, walk, sit, and stand for prolonged periods of time.

8255-7**8255-7**

Working Conditions: Grade 7 pneudraulic systems workers usually perform work inside areas that are adequately lighted, ventilated, and heated. They are frequently exposed to loud noise from the movement of machinery and test equipment; to the possibility of cuts, burns, electrical shock, and bruises from moving parts of machinery; and to unpleasant conditions from dirt, grease, fuel, toxic fumes, solvents, and gases. Floor surfaces are usually composed of vinyl or concrete decking and may be cold, oily, or slippery. Various protective devices such as gloves, ear plugs, face shields, safety shoes, and safety glasses are used.

8255-9 PNEUDRAULIC SYSTEMS MECHANIC, GRADE 9 8255-9

General: Grade 9 pneudraulic systems mechanics disassemble, repair, reassemble, test, troubleshoot, and maintain complex hydraulic and pneumatic components, subsystems, and systems such as pressure regulating and unloading valves; jet engine compressor bleed governors and anti-icing valves; transfer pumps and other hydraulic pumps and motors; actuating, servo, and hydropneumatic cylinders, oil and fuel filters, and manifold valves; landing gear control valves; gas turbine engine oil pumps; and similar items on ground, marine, aircraft, or missile systems.

Unlike the uncomplicated assemblies repaired by Grade 7 level workers, components assigned to grade 9 level mechanics are complex because they are designed to respond to proportional input of variable forces or conditions, control rates of change, and have multiple stage functions and automatic reset or adjustment circuits.

Skill and Knowledge: Grade 9 pneudraulic systems mechanics utilities knowledge of pneumatic, hydraulic, and basic electrical and mechanical principles to diagnose, repair, and test various complex hydraulic and pneumatic components such as hydromechanical fuel control subassemblies, pressure regulators, fuel booster pumps, speed controls, and water injection pumps. They are capable of making qualitative evaluations of the internal seals and leak rates of components, checking all parts for critical dimensions, analyzing the causes of failures, and making the necessary repairs and adjustments to render the components serviceable within required specifications.

Grade 9 mechanics have the ability to use handtools, jigs, fixtures, and instruments such as feeler gauges, micrometers, force indicators, dynamometers, voltmeters, ammeters, profilometers, optical flat instruments, and balancing machines; to apply standard formulae, shop mathematics, trade theories, and industry practices in isolating the causes of malfunctions; to hook up and operate a hydraulic test stand to perform dynamic and static pressure tests and pump performance tests; and to make electrical tests of components in pneudraulic systems. The work at this level requires the ability to read and interpret technical orders, manufacturers' specification manuals, parts supply books, blueprints, and schematic diagrams; and the skill to modify and assemble parts to specified tolerance, remove defects by honing or lapping until specified measurements are met, and adjust for alignment to meet technical specifications relating to modifications.

Responsibility: Grade 9 pneudraulic systems mechanics receive assignments from their immediate supervisor, either orally or through work orders which specify sources of technical data. On new assignments, they are responsible for overhauling the components to assure adequacy of test equipment, special tools, and repair instructions as outlined in technical data furnished by work planners. Grade 9 mechanics independently pretest items before overhaul to ascertain operational deficiencies, determine the degree of disassembly necessary to repair a unit or to incorporate modifications, and determine the methods, techniques, and procedures to use in completing repairs. They perform final operational testing to assure all operational specifications are met. They plan and lay out their work using blueprints, schematics, work

8255-9**8255-9**

orders, and other specifications. The supervisor reviews work for adherence to specifications and accepted trade practices.

Physical Effort: In addition to the physical effort described at the [grade 7 level](#), grade 9 mechanics are frequently required to reach and work in awkward or cramped conditions when positioning items in test stands, and to exercise visual and tactile sensitivity in lapping, polishing, adjusting, and aligning items.

Working Conditions: Working conditions at this level are the same as those described at the [grade 7 level](#).

8255-10 PNEUDRAULIC SYSTEMS MECHANIC, GRADE 10 8255-10

General: Grade 10 pneudraulic systems mechanics disassemble, repair, rebuild, modify, test, troubleshoot, and install more complex hydraulic and pneumatic systems with more extensive repairing, testing, and troubleshooting sequences than the components and systems characteristic of grade 9 level. Systems assigned to grade 10 level mechanics are more complex in that they are designed to adjust automatically to factors such as temperature, humidity, pressure, or rate of change of velocity, or have sensing devices that feed back into the system information on the systems' performance. Such systems may include hydromechanical fuel control systems for afterburners, jet engines, and turbine powered systems; heating-refrigeration and aircraft compressors; servo hydraulic systems used to control and position equipment in rapid response to several variables; and hydraulic constant speed transmissions. Interdependent adjustments and settings are required so that these systems will automatically adjust to their own performance and consistently meet specified operating requirements. These more complex systems are more difficult to adjust and troubleshoot because the impact of their performance requires adjustments and settings to be made over a range of performance levels and as each is made, preceding settings may be affected. Alignment and troubleshooting can be done during the overhaul process (repair, reassemble) as well as for the completed end item.

Grade 10 mechanics may be required to install the system in the area where it is to be used and to perform the final operational test to check the automatic adjustments of the system and to assure that all specifications are met.

Skill and Knowledge: By comparison with grade 9 pneudraulic systems mechanics who troubleshoot, repair, and test complex hydraulic and pneumatic components, subsystems, and systems such as fuel booster pumps and pressure regulators, grade 10 pneudraulic systems mechanics apply a greater knowledge of pneumatic, hydraulic, and basic electrical and mechanical principles to plan, lay out, and perform work involving the repair, test, installation, and maintenance of hydraulic and pneumatic systems of greater complexity such as gas turbine fuel control systems, high pressure fuel pumps, gas generators, internal/external fuel systems, augments computers, aircraft environmental systems, and fuel tank pressurization and vent control valves. Aircraft environmental systems include cabin and equipment heating and air conditioning systems which encompass cooling turbine and sensing devices, boundary layer system which retards formation of ice on wings, oxygen system (liquid and gaseous), bleed air system which furnishes pressurization for the cockpit, and fire extinguishing systems.

Grade 10 mechanics have the ability to diagnose the cause of operational failures, to determine the extent of repairs and whether to rework or replace faulty components, and to estimate time required to complete repairs. They use and adapt the necessary templates, jigs, and fixtures required to complete repairs. Based on their knowledge of the complex interrelationship of numerous subassemblies that make up the total system, they are able to restore the system to optimum serviceable condition.

Pneudraulic mechanics at this level conduct quality of performance and endurance tests in the hydraulic flow metering area. The work requires the skill to operate the applicable test stands

8255-10**8255-10**

and required test adapters in order to calibrate the systems at various rates of speed and under environmental conditions such as temperature, humidity, pressure, altitude, and inlet flow. They are skilled in troubleshooting procedures designed to isolate malfunctions. They are able to perform the necessary rework to ensure the proper operation in accordance with standards and technical specifications. The work may require a working knowledge of the relationship of hydraulic and pneumatic systems to the structure of the aircraft, submarine, ship, or other area where the systems are to be located in order to install and test systems. The work also requires knowledge of the physical principles governing the behavior of fluids (liquids and gases) as they pertain to hydraulic and pneumatic systems and their components and of standard formulae and mathematics, particularly the use of decimal values in computing stop limits and flow values. They are knowledgeable of the basic information sources, technical orders, and other applicable publications and forms; and have the ability to interpret and apply the requirements contained in technical orders, manufacturers' specification manuals, parts supply books, blueprints, and schematic diagrams.

Responsibility: Grade 10 pneudraulic systems mechanics work under the general supervision of the immediate supervisor, who makes assignments orally or in writing describing the equipment to be worked and the priority order. Within this framework, the mechanic makes independent judgments and decisions in determining the area of difficulty, what parts or materials are required, and the work sequence, tools, and materials to use in completing assignments. They plan and lay out their work using blueprints, schematics, technical orders, and other specifications. The supervisor reviews work for adherence to specifications and accepted trade practices, and is usually available for consultation on problems related to design variations, configuration changes, and deviation from standard work practices made to meet established tolerances, prescribed test results, or to achieve systems reliability.

Physical Effort: In addition to the physical effort described at the [grade 9 level](#), some work performed by grade 10 mechanics involves ascending and descending narrow vertical ladders or stagings, often while carrying tools and equipment.

Working Conditions: In addition to the working conditions described at the [grade 7 level](#), grade 10 mechanics may perform work outside exposing them to the prevailing weather conditions and intermittent slippery or uneven surfaces. The work is frequently performed in cramped areas of aircraft, ships, and submarines with minimum light and ventilation. They are exposed to the possibility of serious injury from slipping and falling while working from ladders and stagings.

8255-11 PNEUDRAULIC SYSTEMS MECHANIC, GRADE 11 8255-11

General: Grade 11 pneudraulic systems mechanics perform a variety of maintenance, repair, test, installation, and related activities on unusually complex hydraulic and pneumatic systems such as the pitch and roll channel assembly, the unified fuel control, and other systems and equipment of similar complexity and sophistication. Mechanics at this level work on systems that contain thousands of parts. Because of the great degree of complex interaction among the various devices, components, and subsystems, particular indications or symptoms of defects in one device or subsystem may result from any of a large number of possible malfunctions in other devices or subsystems, or from the cumulative effect of a number of discrepancies in other areas. For example, the unified fuel control consists of three principal subunits: the distribution body, the augmenter, and the gas generator that are combined into an integrated hydraulic-electrical-mechanical system which adjusts automatically to its own performance and external demands. The mechanics must make hundreds of internal independent adjustments during overhaul and test. In addition, the mechanic must make hundreds of critical dimensional checks during the qualitative evaluation of the system. By comparison, during the overhaul of a typical fuel control at the grade 10 level, the number of internal independent adjustments requiring interdependent adjustments during the test is less than a hundred. Thus, the difficulty in isolating and correcting defects in the unified fuel control at grade 11 is much greater than it is in fuel controls and other systems such as those described at the grade 10 level.

The work at this level is performed on systems such as the unified fuel control as an integrated unit including all of its subunits and their components. Work performed on any of the individual subunits as an end item is grade 10 level work or less.

At a minimum, mechanics at this level will pretest, determine cause of malfunction, extent of repair required, install in location where system is to be used or tested, conduct operational check of the total integrated unit, and troubleshoot malfunctions.

Mechanics at this level must draw simultaneously on knowledge of the complete range of pneumatic, hydraulic, mechanical, and electrical systems and subsystems comprising the entire integrated system in order to pretest the unit, disassemble, examine, repair, reassemble, troubleshoot, install, and conduct operational checks of the total integrated unit.

Skill and Knowledge: Grade 11 pneudraulic systems mechanics are able to complete qualitative evaluations of an entire system of unusual complexity such as the unified fuel control system or the pitch and roll channel assembly, to isolate the area of difficulty and determine the extent of repairs required, and to make numerous internal interdependent adjustments and critical dimensional checks, including precise adjustments for alignment, parallelism, and concentricity. For example, they make accurate and precise repairs and alignment such as are required to combine the three subunits of the fuel control into an integrated unit, complete the calibration, install in the location where it is to be used or tested, and conduct operational tests. The mechanics know how the interdependent adjustments accomplished during operational testing relate to each other and to the engine, and apply this knowledge in diagnosing problems and determining corrective action.

8255-11**8255-11**

At this level, the work requires a comprehensive knowledge of pneumatic, hydraulic, mechanical, and basic electrical principles and a broad knowledge of pneudraulic shop and trade practices; for example, knowledge of test equipment capability, standard practices for test and operation, theory of operation of the numerous devices, components, and subsystems comprising the system, and their effect on one another. They are skilled in applying this knowledge to adapt test procedures to available test equipment, to troubleshoot the system, including the ability to use a variety of special tools and test equipment such as hydraulic and pneumatic computer assisted console test stands to simulate operation of the complete system, and to develop short cuts that will result in the return of the system to operation in a limited time.

Grade 11 mechanics are able to interpret complex multiview drawings, schematics, technical orders, manufacturers' specifications, and other materials in order to locate and correct faulty components and devices; know the physical principles governing the behavior of fluids (liquids and gases) as they pertain to hydraulic and pneumatic systems and their components; and use shop mathematics and handbook formulae to calculate angles, clearances, fits, pressure, flow, and other parameters of interest. Sometimes repairs or modifications are performed when blueprints and manufactures' specifications are unavailable or incomplete.

Responsibility: Grade 11 pneudraulic systems mechanics receive assignments from their immediate supervisor in the form of written work orders, inspection reports, and oral instructions. Compared to work performed at the grade 10 level, grade 11 mechanics independently determine the nature of the trouble and extent of repairs required on equipment that is unusually complicated by more variables. In addition to locating the trouble and judging the impact of the repairs, they independently plan the work sequence, complete the project, and make further tests, adjustments, and alignments to ensure that the equipment and all its integral devices are functioning properly. Work at this level is performed with a minimum of guidance; however, the supervisor spot checks work for compliance with acceptable trade practices, technical orders, and operating specifications; and is available with technical advice on unusually difficult problems.

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

Working Conditions: Working conditions at this level are the same as those described at the [grade 10 level](#).