

Industrial Hydraulic Mechanic Certification

An Industrial Hydraulic Mechanic (IHM) fabricates, assembles, tests, maintains, and repairs systems and components. All Mechanic certifications require a three (3)-hour written and a three (3)-hour job performance (hands-on) test.

Understand hydraulic components and their operation.

Understand hydraulic symbols.

- Recognize hydraulic symbols.
- Read circuit diagrams.

Understand the function and operation of system components.

- Understand the function of a reservoir.
- Understand the function of a prime mover.
- Understand the function of pumps and intensifiers.
- Understand the function of valves.
- Understand the function of actuators.
- Understand the function of accumulators.
- Understand the function of fluids.
- Understand the function of fluid conditioning.
- Understand the function of fluid connectors and conductors.
- Understand the function of hydrostatic transmissions.
- Understand the function of accessory components.

Understand component model code breakdown.

- Determine component specifications based on model code.

Understand loads and motion.

Understand the units and terminology.

- Define the operating parameters of a hydraulic system.

Understand force, pressure, area, and flow relationships.

- Understand the Laws of Motion and their relationship to hydraulic actuator movement.
- Understand formulae used to calculate system parameters.

Using Pascal's Law.

- Understand the theoretical force of a cylinder.
- Understand the theoretical torque generated by a hydraulic motor.

Using flow and area relationships.

- Understand flow through an orifice.
- Understand required flow.
- Understand available speed.
- Understand the principles of regenerative circuits.
- Understand how power is calculated in a hydraulic system.
- Understand mechanical advantage.

Maintain and repair hydraulic systems.

Understand commissioning a hydraulic system.

- Use a checklist to perform an inspection.
- Follow a startup procedure.

Understand component installation.

- Identify and select proper fittings, fasteners, and flanges.
- Understand torque specifications.
- Know the proper procedure to replace a shaft seal.

Hydraulic pumps.

- Replace a pump.
- Adjust pump controls.

Coupling types.

- Understand function of flexible couplings.
- Understand coupling alignment terminology.
- Understand how to check for proper alignment.

Hydraulic valves.

- Replace a valve.
- Adjust a valve.
- Replace seals on a valve.

Hydraulic cylinders.

- Overhaul a cylinder.
- Inspect cylinder parts for abnormal wear.
- Understand the proper procedure to assemble tie-rod cylinder.
- Replace and align a hydraulic cylinder.
- Adjust hydraulic packing gland.

Hydraulic motors.

- Replace a motor.

Gas-charged hydraulic accumulators.

- Check and adjust the charge pressure in an accumulator.
- Drain and recharge an accumulator.
- Replace a gas-charged accumulator.

Fluid conductors.

- Replace a hose assembly.
- Replace a tube assembly.
- Understand thread connections.

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System fluid.

- Add hydraulic fluid to the reservoir.
- Understand when to drain, flush, and refill a system
- Transfer fluid through a portable filtration unit.

Fluid cleanliness.

- Draw a fluid sample.
- Replace hydraulic filter elements.

Understand proactive (scheduled) maintenance (PM).

- Perform proactive (scheduled) maintenance (PM).

Troubleshoot hydraulic systems.

Understanding troubleshooting.

- Troubleshooting fundamentals.
- Determine the cause of excessive noise.
- Determine the cause of excessive heat.
- Determine the cause of incorrect flow.
- Determine the cause of incorrect pressure.
- Determine the cause of erratic operation.
- Determine the cause of excessive vibration.
- Determine the cause for a cylinder not extending.
- Determine why a cylinder fails to hold the load.
- Understands potential problems associated with misaligning cylinders.

Component testing.

- Understand how to test a pump.
- Understand how to test a motor.
- Understand how to test a cylinder.
- Understand how to test a valve.

Accumulators.

- Identify common problems caused by under-charged and over-charged accumulators.
- Understand how an accumulator may fail.
- Understand how to test an accumulator.

Contamination control.

- Understand the causes and recognize the signs of fluid contamination control problems.

- Identify causes of foaming (aeration), cavitation (high inlet vacuum), oxidation (over-heating), and water (leakage or condensation).
- Identify contaminants in a hydraulic fluid analysis.
- Associate filter location and condition with system operational characteristics.
- Identify basic tests to check for fluid contamination.

Hose assemblies.

- Recognize causes of hose failures.

ElectroHydraulic control systems.

Electrohydraulic valves.

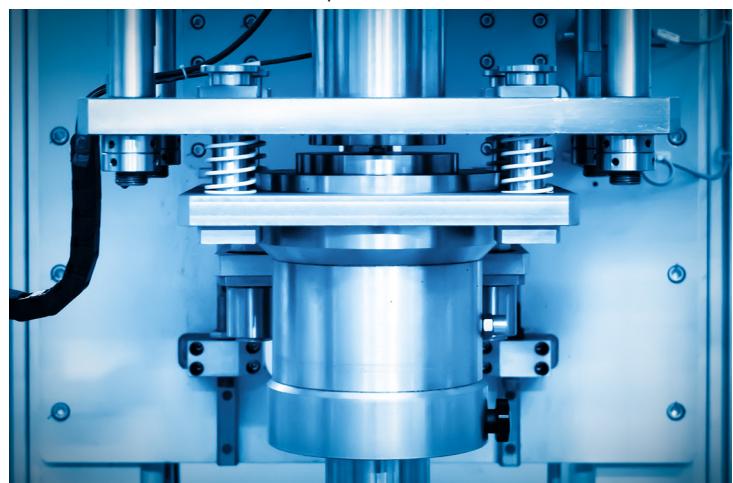
- Understand the operation of solenoid valves.
- Understand the operation of proportional valves.
- Understand the operation of servo valves.

Sensors.

- Understand the operation of transducers.
- Understand the operation of linear position sensors.
- Understand the operation of encoders.

Basic control theory.

- Understand open-loop control.
- Understand closed-loop control.



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Job Performance Stations (hands-on)

Station # 1 Identify Fluid Power Symbols:

Identify 20 components by their symbolic representation on a schematic drawing. The schematic at this station will be either Mobile Hydraulic, Industrial Hydraulic, or Pneumatic depending upon your test. You will be required to give a written explanation for each component. This is not a multiple-choice station.

Station # 2 Identify Fasteners and Fittings:

This station has ten (10) fasteners and ten (10) fittings that require identification as to type, size, length, thread, and grade. Each item has five (5) multiple choice answers from which to choose.

Station # 3 Use of Multimeter:

This station is for testing the candidate in the use of a Multimeter. There are 14 questions for readings taken on a test circuit board. It is not multiple choice. The readings are for voltage, amperage, and resistance.

Station # 4 Measure a Cylinder Piston :

This station tests the ability to take measurements of a hydraulic component and requires proficiency using scales, calipers, and

micrometers. A cylinder piston is used for the measurements. This is not a multiplechoice station. Candidates for JP Station 4 are required to make 10 precision measurements using three tools. Two measurements are made with a steel scale, +/- 1/32". Six measurements are made with a digital caliper, +/- .005". Two additional measurements are made with a micrometer, +/- 0.0005".

Station # 5 Fluid Conductors:

Requires identifying size, type, and pressure ratings of two (2) steel tubes, two (2) rubber hoses, one (1) copper, and one (1) nylon tube. Dial calipers and datasheets are provided to aid in this task. This station is not multiple choice.

Station # 6 Tube Bend and Flare:

Bend and flare a tube assembly to fit a fixture testing the skills of measuring, cutting, flaring, and assembly for compound bending to fit a fixture. All tubing, tools, and datasheets are provided.



The IFPS believes that implementation of safe procedures is para- mount in all fluid power systems, the electrical and electronic controls that guide them, and all associated technologies. The IFPS recommends that, in every circumstance, factory, piece of hydraulic equipment, or application of any fluid power product or its controls, every employee and employer is responsible to know, understand, and practice the safety policies and procedures already in place. Consult manufacturer's safety specifications for each machine. **Take the responsibility to improve the safety standards whenever an opportunity presents itself.** No one knows the equipment better than the people who work with it daily – they are the most important ones to improve that equipment's safety.