



## PIPELINE MECHANICAL

### Competencies / Objectives

## Level One

### MODULE 66101-02 – INTRODUCTION TO THE PIPELINE INDUSTRY

1. Explain the basic functions and purposes of pipelines and facilities and identify the characteristics and hazards of common pipeline products.
2. Identify maps and drawings used to depict pipelines and facilities.
3. Explain the roles of control personnel and equipment in the overall operation of a pipeline.
4. Explain liquid pipeline hydraulics and gas pipeline pneumatics.
5. Explain the types and purposes of pipeline equipment.
6. Explain pipeline electrical power systems and corrosion control.
7. Review operations, maintenance, and emergency procedures and perform documentation required for pipeline operations.

### MODULE 66102-02 – LIQUID PIPELINE GENERAL ABNORMAL OPERATING CONDITIONS

1. Recognize and react to abnormal facility conditions.
2. Recognize and react to activation of a safety device.
3. Recognize and react to communications failures.
4. Recognize and react to power interruptions.
5. Respond appropriately to fire, explosions, and natural disasters.
6. Recognize and react to pipeline system damage.
7. Recognize and react to unexpected hazardous liquid or carbon dioxide (CO<sub>2</sub>) leaks.
8. Recognize and react to unexplained pressure deviations.

### MODULE 63103-02 – PIPELINE MECHANIC HAND AND POWER TOOLS

1. Safely use and care for pipeline mechanic hand tools.
2. Safely use and care for drill presses, hydraulic presses, and pipe threading machines.
3. Safely use and care for selected sheet metal tools.
4. Identify and explain surface grinders and belt sanders.
5. Identify and explain Woodruff key seaters and key broachers.
6. Safely use and care for bearing heaters and drills and perform precision drilling.

### MODULE 63104-02 – PIPING AND MECHANICAL BLUEPRINT READING

1. Identify and explain types and parts of drawings.
2. Read and interpret piping and instrumentation diagrams (P&IDs), plan views, section views, and isometric drawings.
3. Read and interpret machine drawings.

## **MODULE 63105-02 – TUBING, THREADED PIPE, AND HOSES**

1. Identify and explain the materials used in tubing systems.
2. Identify, use, and care for tubing cutters, benders, and flaring tools.
3. Fabricate tubing systems.
4. Identify and explain the materials used in threaded piping systems.
5. Use and care for pipe threading tools.
6. Fabricate threaded piping systems.
7. Identify and select types and sizes of hoses.
8. Maintain hoses used in control systems.

## **MODULE 63106-02 – FASTENERS**

1. Identify and explain threaded and nonthreaded fasteners.
2. Identify and explain insulation fasteners.
3. Install fasteners.

## **MODULE 63107-02 – IDENTIFY, INSTALL, AND MAINTAIN VALVES (CTS 19.1-19.4)**

1. Identify the types of valves used to start and stop flow on a pipeline and regulate flow on a pipeline.
2. Identify and explain the functions of the various types of relief valves.
3. Properly isolate and purge a valve.
4. Understand and perform preventive maintenance and lubrication on pipeline valves (CTs 19.2, 19.3, 19.4).
5. Winterize valves (CT 19.1).
6. Install threaded and flanged valves.

## **MODULE 63108-02 – IDENTIFY TYPES OF VALVE ACTUATORS/OPERATORS**

1. Identify the types of actuators used to open and close valves.
2. Identify the types of controls used with actuators.
3. Explain the principles used for operation of actuators.
4. Perform general maintenance on actuators.

## **MODULE 63109-02 – INSTALLING SEALS AND GASKETS**

1. Identify and explain types of seals.
2. Remove and install seals.
3. Identify and explain gasket types and materials.
4. Layout, cut, and install gaskets.

# Level Two

## **MODULE 63201-02 – INTRODUCTION TO PNEUMATIC SYSTEMS**

1. Explain pneumatic safety.
2. Explain the physical characteristics of gases.
3. Explain the characteristics of natural gas.
4. Explain the pneumatic transmission of energy.
5. Identify and explain types of compressors.
6. Explain compressed-air treatment.

## **MODULE 63202-02 – INTRODUCTION TO HYDRAULIC SYSTEMS**

1. Explain hydraulic system safety.
2. Explain the principles of hydraulics.
3. Identify and explain hydraulic fluids.
4. Identify and explain hydraulic system parts.
5. Identify and explain hydraulic pumps.
6. Identify and explain hydraulic motors.

## **MODULE 63203-02 – SPECIALTY AND PRECISION TOOLS**

1. Identify, use, and care for specialty tools.
2. Identify, use, and care for precision measuring tools.

## **MODULE 63204-02 – INSPECT AND REPAIR VALVES (CT 20, 21.2, 21.3)**

1. Identify the different valve inspection requirements.
2. Describe the routine walk-around inspection requirements for valves or perform a routine walk-around valve inspection (CT 20.1).
3. Describe the external integrity inspections requirements for valves or perform an external integrity valve inspection (CT 20.2).
4. Describe the functional test required for valves or perform a functional valve test (CT 20.3).
5. Describe how to leak test a valve or leak test a valve (CT 20.4).
6. Describe how to disassemble and reassemble a valve or disassemble and reassemble a valve (CT 21.2).
7. Describe the internal inspection requirements of a valve or perform an internal valve inspection (CT 21.3).
8. Describe how to rig a large valve or rig a large valve.

## **MODULE 63205-02 – MAINTAIN AND REPAIR PRESSURE LIMITING DEVICES AND RELIEF VALVES (CT 22, 23.1, 23.2, AND 24)**

1. Identify types of relief valves and pressure limiting devices.
2. Inspect tank pressure/vacuum breaker. Inspect, test, and calibrate HVL tank pressure relief valves (CT 22).
3. Inspect, maintain, and repair relief valves (CT 23.1).
4. Maintain and repair pressure limiting devices (CT 23.2).
5. Inspect, test, and calibrate pressure limiting devices and relief valves (CT 24).

## **MODULE 63206-02 – INTRODUCTION TO METERING DEVICES AND PROVERS**

1. Identify, explain, and/or demonstrate the use of various types of meters.
2. Identify, explain, and/or demonstrate the use of various types of provers.

## **MODULE 63207-02 – INTRODUCTION TO PUMPS**

1. Identify and explain various types of pumps.
2. Explain net positive suction head and cavitation.
3. Install pumps.

## **MODULE 63208-02 – INTRODUCTION TO GAS COMPRESSORS**

1. Identify and explain various types of gas compressors.
2. Explain the function of compressors.
3. Explain the operation of compressors.
4. Identify auxiliary equipment.

## **MODULE 63209-02 – INSTALL AND MAINTAIN BEARINGS**

1. Identify and explain various types of bearings.
2. Explain bearing designation.
3. Remove, troubleshoot, and install bearings.

## **MODULE 63210-02 – INSTALL MECHANICAL SEALS**

1. Identify and explain types of mechanical seals.
2. Explain mechanical seal classification.
3. Remove, inspect, and install mechanical seals.

## **MODULE 63211-02 – MAINTAIN AND REPAIR DRIVERS**

1. Identify types of drivers.
2. Inspect drivers.
3. Replace bearings and seals.
4. Perform preventative maintenance activities.
5. Replace drivers.

# Level Three

## MODULE 63301-02 – INSTALLING ROTATING EQUIPMENT

1. Identify inspection requirements for an equipment pad.
2. Describe the requirements for equipment base preparation.
3. Inspect equipment prior to installation.
4. Prepare equipment prior to installation.
5. Describe the installation process for rotating equipment.
6. Describe the process to relieve pipe stress from rotating equipment.

## MODULE 63302-02 – UNIT ALIGNMENT

1. Recognize and describe the four types of equipment misalignment.
2. Identify the causes of soft foot.
3. Describe the major steps in performing conventional rim-and-face alignment.
4. Describe the major steps in performing reverse dial indicator alignment using the equation method of alignment.
5. Describe the major steps in performing reverse dial indicator alignment using the graphical chart method of alignment.
6. Describe the major steps in performing laser alignment.
7. Identify other laser alignment procedures that may be completed on the machinery trains depending on equipment needs.

## MODULE 63303-02 – VIBRATION ANALYSIS

1. Explain the causes of vibration.
2. Explain vibration analysis.
3. Identify and explain the different kinds of basic vibration test equipment.
4. Explain vibration monitoring.
5. Explain field balancing of machines.

## MODULE 63304-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR PUMPS

1. Describe the preventive maintenance requirements for a pump.
2. Describe the inspection requirements for a pump.
3. Identify common troubleshooting techniques and problems for a pump.
4. Identify the common steps required to prepare a pump for shutdown for maintenance or repair.
5. Identify the common steps required to remove a pump from a pipeline system for maintenance or repair.
6. Identify the common steps to disassemble and reassemble a pump.
7. Identify the common steps required to install the pump after the pump has been reassembled.
8. Identify the common steps to prepare the pump for startup and operational check after maintenance or repair has been completed.

## **MODULE 63305-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR GAS COMPRESSORS**

1. Identify the typical lubrication system components of a gas compressor.
2. Describe the preventive maintenance requirements for a gas compressor.
3. Identify the common troubleshooting techniques for a gas compressor.
4. Identify the common steps required to prepare for shutdown and repair of a gas compressor.
5. Identify the common steps required to isolate a gas compressor from a pipeline system.
6. Identify the common steps required to repair a rotary and reciprocating gas compressor.
7. Identify the common steps required to prepare the gas compressor for start-up and operational check after maintenance has been completed.

## **MODULE 63306-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR PNEUMATIC VALVE ACTUATORS/OPERATORS AND SYSTEMS (CT 19.6 AND 21.1)**

1. Perform pneumatic system preventive maintenance procedures.
2. Inspect pneumatic system components.
3. Read pneumatic system schematic diagrams.
4. Troubleshoot pneumatic systems.
5. Repair pneumatic system components.
6. Adjust pneumatic valve actuators/operators (CT 19.6).
7. Repair pneumatic valve actuators/operators (CT 21.1).

## **MODULE 63307-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR HYDRAULIC VALVE ACTUATORS/OPERATORS AND SYSTEMS (CT 19.7 AND 21.4)**

1. Inspect hydraulic system equipment.
2. Read hydraulic system schematic diagrams.
3. Explain the basic hydraulic principles that must be considered before troubleshooting.
4. Troubleshoot hydraulic systems.
5. Repair hydraulic system components.
6. Adjust hydraulic valve actuators/operators (CT 19.7).
7. Repair hydraulic valve actuators/operators (CT 21.4).

## **MODULE 63308-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR ELECTRIC VALVE ACTUATORS/OPERATORS AND SYSTEMS (CT 19.5 AND 21.5)**

1. Perform preventative maintenance procedures on electric actuators/operators.
2. Inspect electric actuator/operator components.
3. Troubleshoot problems with electric actuators/operators.
4. Adjust electric actuator/operator components (CT 19.5).
5. Repair electric actuator/operator components (CT 21.5).

## **MODULE 63309-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR METERING DEVICES AND PROVERS**

1. Inspect and maintain metering devices.
2. Repair metering devices.
3. Inspect and maintain prover systems.
4. Repair prover systems.
5. Calibrate prover systems.



## Level One

### MODULE 66101-02 – INTRODUCTION TO THE PIPELINE INDUSTRY

| Task Number  | Item | Date(s) | Recorded By |
|--|------|---------|-------------|
| This is a knowledge-based module; there is no performance testing. |      |         |             |

### MODULE 66102-02 – LIQUID PIPELINE GENERAL ABNORMAL OPERATING CONDITIONS

| Task Number  | Item | Date(s) | Recorded By |
|--|------|---------|-------------|
| This is a knowledge-based module; there is no performance testing. |      |         |             |

### MODULE 63103-02 – PIPELINE MECHANIC HAND AND POWER TOOLS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63103-1     | Recognize and identify pipeline mechanic tools.       |         |             |
| 63103-2     | Use and care for pipeline mechanic hand tools.        |         |             |
| 63103-3     | Recognize and identify pipeline mechanic power tools. |         |             |
| 63103-4     | Use and care for pipeline mechanic power tools.       |         |             |

### MODULE 63104-02 – PIPING AND MECHANICAL BLUEPRINT READING

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63104-1     | Identify symbols and abbreviations on P&IDs.                   |         |             |
| 63104-2     | Identify piping arrangement drawings.                          |         |             |
| 63104-3     | Read and interpret coordinates, control points, and elevation. |         |             |
| 63104-4     | Read and interpret P&IDs, plan views, and section views.       |         |             |
| 63104-5     | Identify, read, and interpret isometric drawings.              |         |             |
| 63104-6     | Read and interpret assembly and detail drawings.               |         |             |



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## **PIPELINE MECHANICAL**

### **Materials and Equipment**

## **Level One**

### **MODULE 63103-02 - PIPELINE MECHANIC HAND AND POWER TOOLS**

Transparencies

Markers/chalk

Blank acetate sheets

Transparency pens

Pencils and scratch paper

Copies of Quick Quiz

Module Examination

Performance Profile Sheets

Overhead projector and screen

Whiteboard/chalkboard

Appropriate personal protective equipment

A variety of wrenches, including:

- Straight pipe wrenches

- Offset pipe wrenches

- Strap wrenches

- Chain wrenches

A variety of spanner wrenches, including:

- Pin spanners

- Flat hook spanners

- Adjustable hook eyes

- Face spanners

- Adjustable face types

A variety of tin snips, including:

- Right offset

- Left offset

- Right cut aviation

- Left cut aviation

- Straight cut aviation

- Combination blade

- Straight blade

Pieces of sheet or plate metal, several scribes, and layout dye

Packing pullers and stuffing boxes

Inspection mirrors and flashlights

Retaining ring pliers, shafts, rods, and spindles

Taper gauge and section of pipe

Woodruff key seaters, including one smaller than 2 inches and one 2-inch cutter



## **MODULE 63104-02 - PIPING AND MECHANICAL BLUEPRINT READING**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of your company's policy and procedures manual  
Copies of 49 CFR Part 195 (Liquid) and/or 49 CFR Part 192 (Gas)  
Copies of sample P&IDs  
Copies of sample machine drawings  
Calculators  
Enlarged copies of Figure 6

## **MODULE 63105-02 - TUBING, THREADED PIPE, AND HOSES**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of your company's policy and procedures manual  
Copies of 49 CFR Part 195 (Liquid) and/or 49 CFR Part 192 (Gas)  
Several sections of tubing and a rule, outside caliper, or caliper rule  
Several sections of copper, steel, stainless steel, aluminum, Monel®, Inconel®, Hastelloy®, and poly tubing  
Section of tubing and a sharp pencil, colored felt tip pen, or silver marking pencil  
Sections of tubing with OD and ID burrs and a tube deburring tool  
Several sections of tubing and a variety of tubing cutters, including a hacksaw, a bandsaw, and snips  
Spring tube bender and a section of soft metal tubing  
Compression-type hand bender, table- or bench-mounted tubing bender, and several sections of tubing of different size and thickness  
Pipe threader and die head  
Assorted couplings, unions, bushings, and reducers  
Several lengths of pipe and a variety of fittings  
Pipe joint compounds, including Teflon® tape, liquid Teflon®, and pipe dope  
A variety of nonmetallic hoses  
Male, female, and splicer push-on fittings

## **MODULE 63106-02 - FASTENERS**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Copies of Quick Quiz  
Module Examination  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of your company's policy and procedures manual  
Copies of 49 CFR Part 195 (Liquid) and/or 49 CFR Part 192 (Gas)  
A variety of threaded fasteners  
A variety of retainer rings and several pairs of pliers  
A variety of cotter pins, including a standard pin, humped pin, clinch pin, and hitch, and a section of a shaft with holes drilled crosswise  
A variety of pin fasteners and the necessary tools to install them  
Several sections of insulation and a variety of insulation fasteners  
A variety of threaded, nonthreaded, expandable, and nonexpandable fasteners; the appropriate tools to install these fasteners; and sections of drywall, concrete blocks, and insulation materials

## **MODULE 63107-02 - IDENTIFY, INSTALL, AND MAINTAIN VALVES (CTS 19.1–19.4)**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Copies of the Performance Verification for Covered Task 19  
Copies of the Quick Quiz  
Module Examinations  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of your company's policy and procedures manual  
Copies of 49 CFR Part 195 (Liquid) and/or 49 CFR Part 192 (Gas)  
Appropriate tools for assembling and disassembling various types of valves  
Several valve stems, including:

- Rising stems
- Nonrising stems
- Outside screw-and-yoke stems

Gate, ball, plug, and expanding gate valves  
Globe, angle, Y-type, butterfly, and diaphragm valves  
Copies of a valve maintenance log  
Valve packing-removal tools and a valve packing assembly

## **MODULE 63108-02 - IDENTIFY TYPES OF VALVE ACTUATORS/OPERATORS**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Copies of Quick Quiz  
Module Examination  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of your company's policy and procedures manual  
Copies of 49 CFR Part 195 (Liquid) and/or 49 CFR Part 192 (Gas)  
Sample equipment warranties for valve actuators  
Several copies of manufacturer's instructions for a variety of valve actuators

## **MODULE 63109-02 - INSTALLING SEALS AND GASKETS**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Copies of Quick Quiz  
Module Examination  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of your company's policy and procedures manual  
Copies of 49 CFR Part 195 (Liquid) and/or 49 CFR Part 192 (Gas)  
Sample seal materials, including:  
    Buna-N  
    Leather  
    Silicone  
    Neoprene  
Plastic and elastomer compounds  
Room temperature vulcanizing seals  
A variety of O-rings and lip and oil seals  
Appropriate tools to install O-rings and lip and oil seals  
Mounting thimble, shaft, and seal  
Measuring tapes, gasket cutters, hole punches, and a variety of gasket materials, including:  
    Natural rubber  
    Ethylene propylene diene terpolymer  
    Neoprene  
    Nitrile  
    Silicone  
    Viton  
    Gylon

## Level Two

### MODULE 63201-02 - INTRODUCTION TO PNEUMATIC SYSTEMS

- Transparencies
- Blank acetate sheets
- Transparency pens
- Overhead projector and screen
- Felt-tip markers/chalk
- Pencils and scratch paper
- Module Examinations
- Copies of the Quick Quiz
- Performance Profile Sheets
- Whiteboard/chalkboard
- Appropriate personal protective equipment
- Sliding-vane compressor
- Air compressor and filters
- Several grades of in-line mesh filters
- Valve actuator
- Copies of your company's policy and procedures manual

### MODULE 63202-02 - INTRODUCTION TO HYDRAULIC SYSTEMS

- Transparencies
- Felt-tip markers/chalk
- Blank acetate sheets
- Transparency pens
- Pencils and scratch paper
- Module Examinations
- Copies of the Quick Quiz
- Performance Profile Sheets
- Overhead projector and screen
- Whiteboard/chalkboard
- Appropriate personal protective equipment
- Samples of various types of hydraulic fluids
- Different schedules of steel pipe, including Schedule 40 and Schedule 60
- Piping, tubing, and fittings
- Check valves
- Hydraulic pumps
- Lubricants with different pour points
- Glass jars
- Several frozen ice packs
- Cooler
- Different types and sizes of strainers and filters
- Hydraulic fluid
- Common cylinder

## MODULE 63203-02 - SPECIALTY AND PRECISION TOOLS

Transparencies  
Felt-tip markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations  
Copies of Quick Quiz  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/Chalkboard  
Appropriate personal protective equipment  
Torque wrench  
Torque multiplier  
Hex turn flange spreader  
T-handle flange spreader  
Ratchet action flange spreader  
Hydraulic flange spreader  
Mechanic's level  
Master level  
Shims  
Scrap wood  
Optical level  
Metal tape  
Bevel protractor  
Universal bevel protractors  
Plasti-gauge  
Jo blocks  
Drill shanks of various sizes  
Inside and outside calipers  
Micrometers  
Telescoping gauges  
Dial indicators  
Stroboscopic tachometer

## **MODULE 63204-02 - INSPECT AND REPAIR VALVES (CT 20, 21.2, 21.3)**

- Transparencies
- Blank acetate sheets
- Transparency pens
- Overhead projector and screen
- Felt-tip markers/chalk
- Pencils and scratch paper
- Module Examinations\*
- Performance Profile Sheets\*
- Copies of the Quick Quiz\*\*
- Copies of the Performance Verifications for Covered Tasks 20, 21.1, and 21.3 †
- Copies of 49 CFR Part 195 (Liquid) and/or 49 CFR Part 192 (Gas)
- Copies of your company's policy and procedures manual
- Whiteboard/chalkboard
- Slab-type gate valve
- Expanding plug valve
- Varieties of rigging hardware
- Valve assembly

## **MODULE 63205-02 - MAINTAIN AND REPAIR PRESSURE LIMITING DEVICES AND RELIEF VALVES (CT 22, 23.1, 23.2, 24)**

- Transparencies
- Markers/chalk
- Blank acetate sheets
- Transparency pens
- Pencils and scratch paper
- Module Examinations\*
- Performance Profile Sheets\*
- Overhead projector and screen
- Whiteboard/chalkboard
- Appropriate personal protective equipment
- Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)
- Copies of your company policy and procedures manual
- Several relief valves and PLDs, including:
  - Spring-type pressure relief valve
  - Boot-type relief valve
  - Safety valve
  - Rupture disc device
  - Control valve
  - Electro-hydraulic relief valve
- A copy of your company's procedures for inspecting tank pressure/vacuum breakers
- Copies of the Performance Verifications for Covered Tasks 22, 23.1, 23.2, and 24†

## MODULE 63206-02 - INTRODUCTION TO METERING DEVICES AND PROVERS

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
Copies of API Chapter 4  
Mass flow meters  
A variety of orifice plates  
Several types of meters or photographs of several types of meters, including:  
Turbine meters  
Positive displacement meters  
Ultrasonic meters  
Mass flow meters  
Coriolis-type mass flow meters  
Vortex meters  
Sample meter factor logs  
Graph paper

## **MODULE 63207-02 - INTRODUCTION TO PUMPS**

Transparencies  
Blank acetate sheets  
Transparency pens  
Markers/chalk  
Overhead projector and screen  
Pencils and scratch paper  
Module Examinations  
Performance Profile Sheets  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company's policy and procedures manual  
Gears, including:  
Helical  
Spur  
Herringbone  
Samples or photographs of each type of pump, including:  
Centrifugal pumps  
Rotary pumps  
Reciprocating pumps  
Metering pumps  
Copies of Figures 2 and 20

## **MODULE 63208-02 - INTRODUCTION TO GAS COMPRESSORS**

Transparencies  
Blank acetate sheets  
Transparency pens  
Markers/chalk  
Overhead projector and screen  
Pencils and scratch paper  
Module Examinations\*  
Performance Profile Sheets\*  
Copies of Quick Quiz\*\*  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
Copies of Figure 1 with the callouts covered



## MODULE 63209-02 - INSTALL AND MAINTAIN BEARINGS

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of your company's policy and procedures manual  
Assorted plain bearings  
Assorted ball bearings  
Roller bearings  
Plain, roller, and ball flanged bearings  
One- and two-piece pillow block bearings and takeup bearings  
Bearings with various identification codes  
Used bearings, lintless rags, clean oil, 3-volt ohmmeter, Permatex® or Teflon® tape, fine-tooth file  
Plain bearings and appropriate tools for disassembling and reassembling them  
Equipment required for installing standard sleeve bearings  
A bearing that failed due to fatigue and a bearing that failed due to overload  
Bearings that have failed for various reasons  
Equipment and materials required for packing a bearing  
Equipment required for removing a bearing using a manual bearing puller  
Equipment required for removing a bearing using a press  
Equipment required for removing a bearing using the hydraulic method  
Equipment required for removing a bearing using the temperature method  
Equipment required for installing tapered roller bearings using the temperature mounting method  
Equipment required for installing a thrust bearing using the press mounting method  
Equipment required for installing spherical roller bearings using a hydraulic nut or locknut  
Split-housing pillow block bearings and equipment needed to assemble/disassemble them  
Equipment and materials for troubleshooting, removing, and repairing or replacing bearings

## **MODULE 63210-02 - INSTALL MECHANICAL SEALS**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of the Quick Quiz\*\*  
Copies of your company's policy and procedures manual  
Several types of mechanical seals  
Examples of failed mechanical seals  
Equipment required for removing and inspecting mechanical seals from a pump  
Equipment required for installing mechanical seals on a pump

## **MODULE 63211-02 - MAINTAIN AND REPAIR DRIVERS**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations  
Performance Profile Sheets  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of your company's policy and procedure manual  
Sample engine power ratings  
Examples or photos of electric, diesel, gas, and turbine drivers  
New bearings  
Examples of various types of failed bearings  
Access to bearings requiring replacement  
Equipment required to remove and install bearings  
Access to pipeline drivers  
Equipment required for driver maintenance  
Access to a driver requiring replacement  
Equipment required to replace drivers

# Level Three

## MODULE 63301-02 - INSTALLING ROTATING EQUIPMENT

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Calculators  
Module Examinations\*  
Performance Profile Sheets\*  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or  
49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
A variety of base plates  
Installation drawings  
Sample pumps and/or motors with physical damage  
Sample base plates that are warped, damaged, or cracked  
Equipment to perform the bearing heating method  
Tools and equipment necessary to level base plates, including:  
Jack bolts  
Anchor bolts  
Shims  
Wrenches  
Wedges  
Hammers  
Levels  
Shim packs  
Straightedges  
Feeler gauges  
Tools and materials necessary to perform clearance and interference installation, including:  
Brass hammers  
Key and setscrew couplings  
Cleaning solvents  
Shop clothes  
Tapered shafts  
Locking nuts  
Micrometers  
Nonshrink and epoxy grout  
Forms to practice grouting  
Tools to work the grout

## MODULE 63302-02 - UNIT ALIGNMENT

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations\*  
Performance Profile Sheets\*  
Copies of Quick Quiz\*\*  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
Calculators  
Copies of Figures 1, 2, 3, 4 , 23, 24, and 25 with the titles covered  
Copies of Figure 33 with the callouts covered  
Alignment simulators  
Dial calipers  
Straightedges  
Scales  
Rules  
Feeler gauges  
Chain indicator jigs  
Dial indicators  
Graphical alignment charts  
Graph paper  
Reverse indicator plotting guides  
Sample alignment records

## **MODULE 63303-02 - VIBRATION ANALYSIS**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations\*  
Performance Profile Sheets\*  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
A variety of transducers, including:  
Velocity transducers  
Accelerometers  
Displacement transducers  
A variety of vibration test equipment, including:  
Meters  
Oscilloscopes  
Spectrum analyzers  
Electronic filters  
Stroboscopes  
A variety of vibration recording instruments, including strip chart recorders and data collectors  
Sample vibration monitoring forms

## **MODULE 63304-02 - MAINTAIN, TROUBLESHOOT, AND REPAIR PUMPS**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations\*  
Performance Profile Sheets\*  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
Completed inspection reports  
Sample manufacturers' manuals, including procedures, schematics, and line drawings  
Copies of Figure 13 with the callouts covered

## MODULE 63305-02 - MAINTAIN, TROUBLESHOOT, AND REPAIR GAS COMPRESSORS

Transparencies

Markers/chalk

Blank acetate sheets

Transparency pens

Pencils and scratch paper

Module Examinations\*

Performance Profile Sheets\*

Overhead projector and screen

Whiteboard/chalkboard

Appropriate personal protective equipment

Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)

Copies of your company policy and procedures manual

Copies of Figures 1, 2, and 3 with the callouts covered

Copies of manufacturers' specifications for gas compressors

Copies of manufacturers' maintenance manuals, including recommended startup checklists

Gas compressors on which to practice maintenance and repair techniques

Tools and materials to repair common rotary compressor components, including:

Mechanical seals

O-rings

Thread caulking

Silicone caulking

Oil pumps

Couplings

Lubricant

Fasteners

Oil

Straightedges

Tools and materials to repair common reciprocating compressor components, including:

Crossheads

Drive chains

Screws

Nuts

Dust plugs

Sprockets

Drift punches

Washers

Valve caps

Bolts

O-rings

Machinist's rules

Lube oil pump chain sprockets

Sprocket setscrews

Woodruff keys

Gaskets

Metal files

## **MODULE 63305-02 - MAINTAIN, TROUBLESHOOT, AND REPAIR GAS COMPRESSORS (Continued)**

Lubricator  
Pry bars  
Screwdrivers  
Valve tools  
Anti-seize lubricant  
Valve retainer  
Lubricant  
Sample documentation for startup and operational checks

## **MODULE 63306-02 - MAINTAIN, TROUBLESHOOT, AND REPAIR PNEUMATIC VALVE ACTUATORS/OPERATORS AND SYSTEMS (CT 19.6 AND 21.1)**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations\*  
Performance Profile Sheets\*  
Copies of Quick Quiz\*\*  
Copies of Performance Verifications for Covered Tasks 19.6 and 21.1†  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
Sample manufacturer's warranties  
Sample preventive maintenance records and schedules  
Sample equipment records  
Pneumatic schematic diagrams  
Sample actuators/operators and the necessary tools for disassembly and reassembly  
Manufacturers' instruction manuals for the sample actuators/operators  
A variety of new and damaged gauges  
Sample valve maintenance logs

## **MODULE 63307-02 - MAINTAIN, TROUBLESHOOT, AND REPAIR HYDRAULIC VALVE ACTUATORS/OPERATORS AND SYSTEMS (CT 19.7 AND 21.4)**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations\*  
Performance Profile Sheets\*  
Copies of Performance Verifications for Covered Tasks 19.7 and 21.4\*\*  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
Sample preventive maintenance schedules  
Sample maintenance records and equipment logs  
Pyrometer  
Clamp-on ammeter  
Sample hydraulic pump with the necessary tools for disassembly and assembly  
Manufacturers' instruction manuals for the sample hydraulic pumps  
Hydraulic system control valves and the necessary tools for disassembly and assembly  
A variety of replacement parts for a hydraulic actuator/operator and the corresponding manufacturers' specifications  
A variety of hydraulic hoses and the necessary tools to cut them  
Hydraulic schematic drawings  
Copies of manufacturers' instruction manuals for a variety of hydraulic system components



## **MODULE 63308-02 - MAINTAIN, TROUBLESHOOT, AND REPAIR ELECTRIC VALVE ACTUATORS/OPERATORS AND SYSTEMS (CT 19.5 AND 21.5)**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations\*  
Performance Profile Sheets\*  
Copies of Performance Verifications for Covered Tasks 19.5 and 21.5\*\*  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
Sample valve maintenance logs  
Computer-generated work orders  
Grease guns  
Valve stems  
Copies of Figure 10 with the legend covered  
Tools and materials to  
    Apply external and internal lubricants  
    Disassemble bolt-on and machine-fitted spur-gear attachments  
    Remove worm gear assemblies  
Tools and materials to disassemble and assemble  
    Single reduction worm gears  
    Actuator/operator bearing assemblies  
    Bevel gear actuator/operators  
Lubricants  
Brushes  
Cleaning solvents  
Shop cloths  
Sample P&IDs  
Inspection checklists  
Bolt-on and machine-fitted spur gear attachments  
Manufacturer's instruction manuals for limit switches  
Torque switch  
Stem nut assembly

## **MODULE 63309-02 - MAINTAIN, TROUBLESHOOT, AND REPAIR METERING DEVICES AND PROVERS**

Transparencies  
Markers/chalk  
Blank acetate sheets  
Transparency pens  
Pencils and scratch paper  
Module Examinations\*  
Performance Profile Sheets\*  
Overhead projector and screen  
Whiteboard/chalkboard  
Appropriate personal protective equipment  
Copies of 49 CFR Part 192 (Gas) and/or 49 CFR Part 195 (Liquid)  
Copies of your company policy and procedures manual  
API Manual of Petroleum Measurement Standards  
Typical strainer assembly  
Tools and materials to clean a typical strainer assembly and to disassemble a turbine meter  
Meter clearance records  
Practice meters  
Appropriate measuring gauges  
Components of a disassembled positive displacement meter  
Materials to clean positive displacement meter components  
Proving spheres  
Calipers  
Sizing rings  
Steel tape

## MODULE 63105-02 – TUBING, THREADED PIPE, AND HOSES

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63105-1     | Identify and explain the materials used in tubing systems.              |         |             |
| 63105-2     | Identify, use, and care for tubing cutters, benders, and flaring tools. |         |             |
| 63105-3     | Fabricate tubing systems.   |         |             |
| 63105-4     | Identify and explain the materials used in threaded piping systems.     |         |             |
| 63105-5     | Use and care for pipe threading tools.                                  |         |             |
| 63105-6     | Fabricate threaded piping systems.                                      |         |             |
| 63105-7     | Identify and select types and sizes of hoses.                           |         |             |
| 63105-8     | Maintain hoses used in control systems.                                 |         |             |

## MODULE 63106-02 – FASTENERS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63106-1     | Identify and explain threaded fasteners.    |         |             |
| 63106-2     | Identify and explain nonthreaded fasteners. |         |             |
| 63106-3     | Identify and explain insulation fasteners.  |         |             |
| 63106-4     | Install fasteners.                          |         |             |

## MODULE 63107-02 – IDENTIFY, INSTALL, AND MAINTAIN VALVES

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63107-1     | Identify types of valves that start and stop flow.                   |         |             |
| 63107-2     | Identify types of valves that regulate flow and pressure.            |         |             |
| 63107-3     | Identify and explain the function of various types of relief valves. |         |             |
| 63107-4     | Perform preventive maintenance (CTs 19.3, 19.4).                     |         |             |
| 63107-5     | Perform regular lubrication of valves (CT 19.2).                     |         |             |
| 63107-6     | Winterize valves (CT 19.1).  |         |             |
| 63107-7     | Install threaded valves.   |         |             |
| 63107-8     | Install flanged valves.  |         |             |
| 63107-9     | Properly isolate and purge a valve.                                  |         |             |

## MODULE 63108-02 – IDENTIFY TYPES OF VALVE ACTUATORS/OPERATORS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63108-1     | Identify types of actuators.                  |         |             |
| 63108-2     | Identify types of actuator controls.          |         |             |
| 63108-3     | Explain principles of operation of actuators. |         |             |
| 63108-4     | Perform general maintenance on actuators.     |         |             |

## MODULE 63109-02 – INSTALLING SEALS AND GASKETS

| Task Number | Item                                   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63109-1     | Identify and explain types of seals.   |         |             |
| 63109-2     | Identify and explain seal materials.   |         |             |
| 63109-3     | Remove and install seals.              |         |             |
| 63109-4     | Identify and explain gasket types.     |         |             |
| 63109-5     | Identify and explain gasket materials. |         |             |
| 63109-6     | Lay out and cut gaskets.               |         |             |
| 63109-7     | Install gaskets.                       |         |             |

# Level Two

## MODULE 63201-02 – INTRODUCTION TO PNEUMATIC SYSTEMS

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63201-1     | Demonstrate steps and precautions you should take when working with pneumatic systems. |         |             |
| 63201-2     | Identify different types of compressors and their components.                          |         |             |
| 63201-3     | Demonstrate how different types of compressors work.                                   |         |             |

## MODULE 63202-02 – INTRODUCTION TO HYDRAULIC SYSTEMS

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63202-1     | Demonstrate steps and precautions you should take when working with hydraulic systems.                 |         |             |
| 63202-2     | Identify types of hydraulic fluid.   |         |             |
| 63202-3     | Identify hydraulic system parts, explain how they work, and describe their role in a hydraulic system. |         |             |
| 63202-4     | Describe the classifications of hydraulic pumps.   |         |             |
| 63202-5     | Identify different types of hydraulic motors and how they work.  |         |             |

## MODULE 63203-02 – SPECIALTY AND PRECISION TOOLS

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63203-1     | Identify a given specialty tool, state its application, and describe its safe use and maintenance. |         |             |
| 63203-2     | Demonstrate the use of a given specialty tool according to the standards given by the instructor.  |         |             |
| 63203-3     | Identify a given precision tool, state its application, and describe its safe use and maintenance. |         |             |
| 63203-4     | Demonstrate the use of a given precision tool according to the standards given by the instructor.  |         |             |

## MODULE 63204-02 – INSPECT AND REPAIR VALVES

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63204-1     | Identify the different valve inspection requirements.  |         |             |
| 63204-2     | Describe the routine walk-around inspection requirements for valves or perform a routine walk-around valve inspection (CT 20.1). |         |             |
| 63204-3     | Describe the external integrity inspection requirements for valves or perform an external integrity inspection (CT 20.2).        |         |             |
| 63204-4     | Describe the functional test required for valves or perform a functional valve test (CT 20.3).                                   |         |             |
| 63204-5     | Describe how to leak test a valve or perform a leak test on a valve (CT 20.4).   |         |             |
| 63204-6     | Describe how to disassemble and reassemble a valve or disassemble and reassemble a valve (CT 21.2).                              |         |             |
| 63204-7     | Describe the internal inspection requirements of a valve or perform an internal valve inspection (CT 21.3).                      |         |             |
| 63204-8     | Rig a large valve or describe how to rig a large valve.  |         |             |

## MODULE 63205-02 – MAINTAIN AND REPAIR PRESSURE LIMITING DEVICES & RELIEF VALVES

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63205-1     | Identify types of relief valves and pressure limiting devices.                    |         |             |
| 63205-2     | Inspect tank pressure/vacuum breaker (CT 22).                                     |         |             |
| 63205-3     | Inspect, test, and calibrate HVL tank pressure relief valves (CT 22).             |         |             |
| 63205-4     | Inspect, test, and calibrate pressure limiting devices and relief valves (CT 24). |         |             |
| 63205-5     | Inspect, maintain, and repair relief valves (CT 23.1).                            |         |             |
| 63205-6     | Maintain and repair pressure limiting devices (CT 23.2).                          |         |             |

## MODULE 63206-02 – INTRODUCTION TO METERING DEVICES AND PROVERS

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63206-1     | Identify, explain, and/or demonstrate the use of various types of meters.  |         |             |
| 63206-2     | Identify, explain, and/or demonstrate the use of various types of provers. |         |             |

## MODULE 63207-02 – INTRODUCTION TO PUMPS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63207-1     | Identify various types of pumps and their components.   |         |             |
| 63207-2     | Explain how various types of pumps work.                |         |             |
| 63207-3     | Define net positive suction head.                       |         |             |
| 63207-4     | Define cavitation and describe the damage it can cause. |         |             |
| 63207-5     | Install or simulate installing a pump.                  |         |             |

## MODULE 63208-02 – INTRODUCTION TO GAS COMPRESSORS

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63208-1     | Identify and explain various types of gas compressors. |         |             |
| 63208-2     | Explain the function of compressors.                   |         |             |
| 63208-3     | Explain the operation of compressors.                  |         |             |
| 63208-4     | Identify auxiliary equipment.                          |         |             |

## MODULE 63209-02 – INSTALL AND MAINTAIN BEARINGS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63209-1     | Identify types of bearings and explain how they work. |         |             |
| 63209-2     | Explain bearing designation.                          |         |             |
| 63209-3     | Troubleshoot bearings.                                |         |             |
| 63209-4     | Remove bearings.                                      |         |             |
| 63209-5     | Install bearings.                                     |         |             |

## MODULE 63210-02 – INSTALL MECHANICAL SEALS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63210-1     | Identify types of mechanical seals and explain how they work. |         |             |
| 63210-2     | Explain mechanical seal classification.                       |         |             |
| 63210-3     | Remove a mechanical seal.                                     |         |             |
| 63210-4     | Troubleshoot a mechanical seal.                               |         |             |
| 63210-5     | Install a mechanical seal.                                    |         |             |

## MODULE 63211-02 – MAINTAIN AND REPAIR DRIVERS

| Task Number | Item                                       | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63211-1     | Identify types of drivers.                 |         |             |
| 63211-2     | Inspect drivers.                           |         |             |
| 63211-3     | Replace bearings and seals.                |         |             |
| 63211-4     | Perform preventive maintenance activities. |         |             |
| 63211-5     | Replace drivers.                           |         |             |



# Level Three

## MODULE 63301-02 – INSTALLING ROTATING EQUIPMENT

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63301-1     | Identify and describe the inspection requirements for an equipment pad. |         |             |
| 63301-2     | Describe, inspect, and prepare equipment prior to installation.         |         |             |
| 63301-3     | Describe the installation process for rotating equipment.               |         |             |
| 63301-4     | Describe the process to relieve pipe stress from rotating equipment.    |         |             |

## MODULE 63302-02 – UNIT ALIGNMENT

| Task Number | Item   | Date(s) | Recorded By |
|-------------|--|---------|-------------|
| 63302-1     | Recognize and describe the four types of equipment misalignment.   |         |             |
| 63302-2     | Describe the major steps in performing each of the following: <ul style="list-style-type: none"><li>• Conventional rim-and-face alignment</li><li>• Reverse dial indicator alignment using the equation method of alignment</li><li>• Reverse dial indicator alignment using the graphical chart method of alignment</li><li>• Laser alignment</li></ul> |         |             |

## MODULE 63303-02 – VIBRATION ANALYSIS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63303-1     | Identify and explain the different kinds of basic vibration test equipment. |         |             |

## MODULE 63304-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR PUMPS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63304-1     | Describe the preventive maintenance requirements for a pump.  |         |             |
| 63304-2     | Describe the inspection requirements for a pump.  |         |             |
| 63304-3     | Demonstrate common troubleshooting techniques and identify common problems for a pump.  |         |             |
| 63304-4     | Demonstrate the common steps to perform each of the following: <ul style="list-style-type: none"><li>• Prepare a pump for shutdown for maintenance or repair.</li><li>• Remove a pump from a pipeline system for maintenance or repair.</li><li>• Disassemble and reassemble a pump.</li><li>• Prepare a pump for startup and operation check after maintenance or repair has been completed.</li></ul> |         |             |

## MODULE 63305-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR GAS COMPRESSORS

| Task Number | Item  | Date(s) | Recorded By |
|-------------|---|---------|-------------|
| 63305-1     | Identify the typical lubrication system components of a gas compressor.   |         |             |
| 63305-2     | Describe the preventive maintenance requirements for a gas compressor.  |         |             |
| 63305-3     | Demonstrate common troubleshooting techniques for a gas compressor.   |         |             |
| 63305-4     | Demonstrate the common steps to perform each of the following: <ul style="list-style-type: none"><li>• Prepare a gas compressor for shutdown and repair.</li><li>• Isolate a gas compressor from a pipeline system.</li><li>• Repair a rotary and reciprocating gas compressor.</li><li>• Prepare the gas compressor for start-up and operational check after maintenance or repair has been completed.</li></ul> |         |             |

**MODULE 63306-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR PNEUMATIC VALVE ACTUATORS/OPERATORS AND SYSTEMS**

| <b>Task Number</b> | <b>Item</b>  | <b>Date(s)</b> | <b>Recorded By</b> |
|--------------------|--|----------------|--------------------|
| 63306-1            | Perform preventive maintenance procedures on a pneumatic system. |                |                    |
| 63306-2            | Inspect pneumatic system components.                             |                |                    |
| 63306-3            | Troubleshoot pneumatic systems.                                  |                |                    |
| 63306-4            | Repair pneumatic system components.                              |                |                    |
| 63306-5            | Adjust pneumatic valve actuators/operators (CT 19.6).            |                |                    |
| 63306-6            | Repair pneumatic valve actuators/operators (CT 21.1).            |                |                    |

**MODULE 63307-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR HYDRAULIC VALVE ACTUATORS/OPERATORS AND SYSTEMS**

| <b>Task Number</b> | <b>Item</b>   | <b>Date(s)</b> | <b>Recorded By</b> |
|--------------------|---|----------------|--------------------|
| 63307-1            | Inspect hydraulic system equipment.                   |                |                    |
| 63307-2            | Troubleshoot hydraulic system components.             |                |                    |
| 63307-3            | Repair hydraulic system components.                   |                |                    |
| 63307-4            | Adjust hydraulic valve actuators/operators (CT 19.7). |                |                    |
| 63307-5            | Repair hydraulic valve actuators/operators (CT 21.4). |                |                    |

**MODULE 63308-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR ELECTRIC VALVE ACTUATORS/OPERATORS AND SYSTEMS**

| <b>Task Number</b> | <b>Item</b>  | <b>Date(s)</b> | <b>Recorded By</b> |
|--------------------|--|----------------|--------------------|
| 63308-1            | Perform preventative maintenance procedures on electric actuators/operators. |                |                    |
| 63308-2            | Inspect electric actuator/operator components.                               |                |                    |
| 63308-3            | Troubleshoot problems with electric actuators/operators.                     |                |                    |
| 63308-4            | Adjust electric actuator/operator components (CT 19.5).                      |                |                    |
| 63308-5            | Repair electric actuator/operator components (CT 21.5).                      |                |                    |

**MODULE 63309-02 – MAINTAIN, TROUBLESHOOT, AND REPAIR METERING DEVICES  
AND PROVERS**

| <b>Task Number</b> | <b>Item</b>                                     | <b>Date(s)</b> | <b>Recorded By</b> |
|--------------------|---|----------------|--------------------|
| 63309-1            | Inspect, maintain, and repair metering devices. |                |                    |
| 63309-2            | Inspect, maintain, and repair prover systems.   |                |                    |
| 63309-3            | Calibrate prover systems.                       |                |                    |