

MODULE OVERVIEW

This module introduces the different types of hand and power tools that a pipeline mechanic will use. Trainees will learn the procedures for selecting, using, caring for, and maintaining these tools.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following modules:

Core Curriculum; Pipeline Core, Modules 66101 and 66102

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Recognize and identify pipeline mechanic tools.
2. Use and care for pipeline mechanic hand tools.
3. Recognize and identify pipeline mechanic power tools.
4. Use and care for pipeline mechanic power tools.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

Transparencies	A variety of tin snips, including:
Markers/chalk	Right offset
Blank acetate sheets	Left offset
Transparency pens	Right cut aviation
Pencils and scratch paper	Left cut aviation
Copies of Quick Quiz*	Straight cut aviation
Module Examination**	Combination blade
Performance Profile Sheets**	Straight blade
Overhead projector and screen	Pieces of sheet or plate metal, several scribes, and layout dye
Whiteboard/chalkboard	Packing pullers and stuffing boxes
Appropriate personal protective equipment	Inspection mirrors and flashlights
A variety of wrenches, including:	Retaining ring pliers, shafts, rods, and spindles
Straight pipe wrenches	Taper gauge and section of pipe
Offset pipe wrenches	Woodruff key seaters, including one smaller than 2 inches and one 2-inch cutter
Strap wrenches	
Chain wrenches	
A variety of spanner wrenches, including:	
Pin spanners	
Flat hook spanners	
Adjustable hook eyes	
Face spanners	
Adjustable face types	

* Located in the Annotated Instructor's Guide for this module.

** Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module reviews the types and parts of drawings that are necessary to locate and maintain equipment in a piping system. The module also explains how to read and interpret the drawings.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following modules:

Core Curriculum; Pipeline Core, Modules 66101 and 66102; Pipeline Mechanical Level One, Module 63103

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Identify symbols and abbreviations on P&IDs.
2. Identify piping arrangement drawings.
3. Read and interpret coordinates, control points, and elevation.
4. Read and interpret P&IDs, plan views, and section views.
5. Identify, read, and interpret isometric drawings.
6. Read and interpret assembly and detail drawings.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

* Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module discusses the materials used in tubing and threaded piping systems. It also reviews the use of and how to care for the various tools and materials used in these systems. Trainees will learn how to fabricate tubing and threaded piping systems and how to maintain hoses.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following modules:

Core Curriculum; Pipeline Core, Modules 66101 and 66102; Pipeline Mechanical Level One, Modules 63103 and 63104

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

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.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

* Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

Course Planning Tools**MODULE OVERVIEW**

This module reviews threaded, nonthreaded, and insulation fasteners. Trainees will learn how to select and install the proper fastener for each type of job.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following modules:

Core Curriculum; Pipeline Core, Modules 66101 and 66102; Pipeline Mechanical Level One, Modules 63103 through 63105

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

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

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

Transparencies	A variety of threaded fasteners
Markers/chalk	A variety of retainer rings and several pairs of pliers
Blank acetate sheets	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
Transparency pens	A variety of pin fasteners and the necessary tools to install them
Pencils and scratch paper	Several sections of insulation and a variety of insulation fasteners
Copies of Quick Quiz*	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 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 <i>49 CFR Part 195 (Liquid)</i> and/or <i>49 CFR Part 192 (Gas)</i>	

* Located in the Annotated Instructor's Guide for this module.

** Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module reviews the different types of valve actuators and the controls used to operate them. Trainees will learn the principles of operation and general maintenance procedures.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following modules:

Core Curriculum; Pipeline Core, Modules 66101 and 66102; Pipeline Mechanical Level One, Modules 63103 through 63107

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Identify types of actuators.
2. Identify types of actuator controls.
3. Explain principles of operation of actuators.
4. Perform general maintenance on actuators.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

* Located in the Annotated Instructor's Guide for this module.

** Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module reviews seal and gasket types and discusses common seal and gasket materials. Trainees will learn how to remove and install seals and how to lay out, cut, and install gaskets.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following modules:

Core Curriculum; Pipeline Core, Modules 66101 and 66102; Pipeline Mechanical Level One, Modules 63103 through 63108

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Identify and explain types of seals.
2. Identify and explain seal materials.
3. Remove and install seals.
4. Identify and explain gasket types.
5. Identify and explain gasket materials.
6. Lay out and cut gaskets.
7. Install gaskets.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

* Located in the Annotated Instructor's Guide for this module.

** Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module introduces trainees to the principles of pneumatics, which is the study of energy transmission through gases. In the gas pipeline industry, pneumatics governs the storage, compression, and transmission of gases to end users. The module reviews the types and components of closed-loop pneumatic systems and discusses how to troubleshoot, repair, and maintain such systems.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following:

Core Curriculum; Pipeline Core, Modules 66101-02 and 66102-02; Pipeline Mechanical Level One

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Demonstrate steps and precautions you should take when working with pneumatic systems.
2. Identify different types of compressors and their components.
3. Demonstrate how different types of compressors work.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

** Located in the Annotated Instructor's Guide for this module.

* Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

In the gas pipeline industry, proper repair and maintenance of hydraulic systems is essential for safe and efficient pipeline operation. This module introduces trainees to the principles of hydraulics, which is the study of the behavior of fluids at rest and in motion. Hydraulic system components and applications are also reviewed.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following:

Core Curriculum; Pipeline Core, Modules 66101-02 and 66102-02; Pipeline Mechanical Level One; Pipeline Mechanical Level Two, Module 63101-02

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Demonstrate steps and precautions you should take when working with hydraulic systems.
2. Identify types of hydraulic fluid.
3. Identify hydraulic system parts, explain how they work, and describe their role in a hydraulic system.
4. Describe the classifications of hydraulic pumps.
5. Identify different types of hydraulic motors and how they work.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

** Located in the Annotated Instructor's Guide for this module.

* Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

Pipelines depend upon accurate measurement to keep equipment operating in a dependable, efficient, and safe manner. Engines, motors, pumps, valves, and a host of other equipment use shafts, bearings, and parts that must operate at very close tolerances to maintain their effectiveness and reliability. This module introduces trainees to the specialty tools, precision rules and gauges, and precision measuring tools that are used to keep pipelines in working order. Trainees will learn how to recognize, select, inspect, maintain, and use the tools and equipment.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following:

Core Curriculum; Pipeline Core, Modules 66101-02 and 66102-02; Pipeline Mechanical Level One; Pipeline Mechanical Level Two, Modules 63201-02 and 63202-02

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Identify a given specialty tool, state its application, and describe its safe use and maintenance.
2. Demonstrate the use of a given specialty tool according to the standards given by the instructor.
3. Identify a given precision tool, state its application, and describe its safe use and maintenance.
4. Demonstrate the use of a given precision tool according to the standards given by the instructor.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

** Located in the Annotated Instructor's Guide for this module.

* Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module introduces the various types of meters and provers used on pipelines. Trainees will learn how to identify and operate meters and provers.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following:

Core Curriculum; Pipeline Core, Modules 66101-02 and 66102-02; Pipeline Mechanical Level One, Pipeline Mechanical Level Two, Modules 63201-02 through 63205-02

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

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.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

* Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module discusses the various types of pumps and their components. Trainees will learn how to identify and install these pumps, as well as how to explain net positive suction head and how to cure cavitation.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following:

Core Curriculum; Pipeline Core, Modules 66101-02 and 66102-02; Pipeline Mechanical Level One; Pipeline Mechanical Level Two, Modules 63201-02 through 63206-02

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Identify various types of pumps and their components.
2. Explain how various types of pumps work.
3. Define net positive suction head.
4. Define cavitation and describe the damage it can cause.
5. Install or simulate installing a pump.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

* Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module introduces trainees to the various types of gas compressors, explains how they function, and discusses some common applications for each type.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following:

Core Curriculum; Pipeline Core, Modules 66101-02 and 66102-02; Pipeline Mechanical Level One; Pipeline Mechanical Level Two, Modules 63201-02 through 63206-02

OBJECTIVES

Upon completion of this module, the trainee will be able to:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

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.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, Performance Tasks, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

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

** Located in the Annotated Instructor's Guide for this module.

* Performance Sheets for this module are available from NCCER's Instructor Resource Center at www.nccerirc.com.

For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.

MODULE OVERVIEW

This module discusses preventive and predictive maintenance. Trainees will learn to conduct general maintenance on pipeline equipment and to winterize pipelines and equipment.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following:

Core Curriculum; Pipeline Core, Modules 66101-02 and 66102-02; Pipeline Maintenance Level One; Pipeline Maintenance Level Two

OBJECTIVES

Upon completion of this module, the trainee will be able to:

1. Explain preventive and predictive maintenance.
2. Perform general maintenance on rotating equipment.
3. Maintain pumps and prime movers.
4. Maintain tank mixers.
5. Winterize pipelines and equipment.

PERFORMANCE TASKS

This is a knowledge-based module—there is no performance examination.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

PREPARATION

Before teaching this module, you should review the Module Outline, Objectives, and the Materials and Equipment List. Be sure to allow ample time to prepare your own training or lesson plan and gather all required equipment and materials.

MATERIALS AND EQUIPMENT LIST

Transparencies	Bearings that have loose and/or cracked housings, loose bolts, and seal problems
Markers/chalk	
Blank acetate sheets	A variety of machine monitoring equipment, including
Transparency pens	Surface thermometers
Pencils and scratch paper	Stethoscopes and microphones
Module Examinations*	Vibration monitors
Overhead projector and screen	Balancing machines
Whiteboard/chalkboard	Variety of pump maintenance cards or computerized maintenance management system records
Appropriate personal protective equipment	Manufacturer's instruction manual for the service and maintenance of the following:
Copies of <i>49 CFR Part 192</i> (Gas) and/or <i>49 CFR Part 195</i> (Liquid)	Pump or prime movers
Copies of your company policy and procedures manual	Gas compressors
Vibration meter	Tank mixers

* For information and updates about accessing the Module Examinations, visit www.nccer.org/testing.