

M-01: Install Piping System (Pneumatic/Water, Steam, and Gas)

SAFETY FIRST

- Follow all Caterpillar facility safety standards when performing this task.
- Wear a safety harness and follow all Caterpillar safety procedures when working with a ladder, scaffold or man lifts.
- Wear gloves and be aware of potential heat hazards when working on pipe.

EQUIPMENT

- Maintenance Mechanic hand tools
- tape measure
- plumb bob
- carpenter's square
- threading machine
- deburring tool
- two foot level
- nine inch torpedo level

RESOURCES

- bill of materials (BOM)
- pipefitter handbook
- manufacturer's manual
- Plant Engineering Practices Manual
- fitting allowances card



Install Piping System (Pneumatic/Water, Steam, and Gas)

1. Identify the product piping requirements.

- Follow the requirements in the manufacturer's manual for the machine or follow Caterpillar Engineering Practices for building systems.

2. Locate the supply point for the installation.

- Verify the product as labeled on the pipe or from a similar application from the system.

3. Determine and obtain materials.

- Select the piping material according to the Caterpillar Engineering Practices Manual.
- Determine the type and quantity of required fittings, valves, unions, nipples, sealants, hangers, supports, insulation, etc.
- Order materials as needed.

4. Layout/route piping path.

- Obtain the schematic for the proposed installation.
- Take preliminary measurements to determine required materials for the system.

Note: All piping must be plumb and square to existing structure and systems.

Note: When planning to route pipe, keep in mind leaving accessibility for machine operators, other utilities, and possible future installations. Knowledge of how machines and systems operate in the area is very important.

- Determine if any parts or machines need to be removed or where piping may need to be routed around them.
- Determine where shut-off valves are needed.



- Determine required holds/supports.



Example of a
Hanger Bracket

5. Measure piping in sections.

- Determine two fixed points for a section.
- Measure from centers.
- Use a tape, plumb bob, levels, and a carpenter's square as needed to obtain accurate measurements.
- Depending upon the piping system you are installing, all the pipe may need to be cut at one time and carried to the job site. All measurements may need to be exactly calculated and noted at one time.

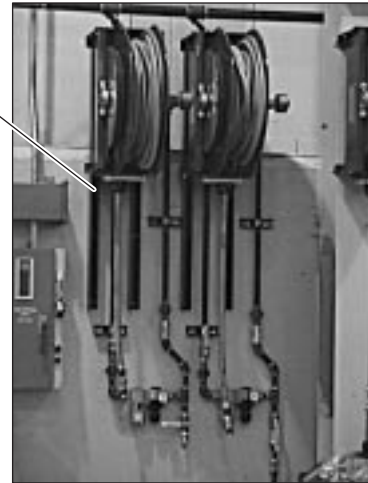
Warning: Perform and verify lockout/tagout before working on the existing supply system.

6. Install piping sections.

- Cut each pipe in the section according to your measurements.
- Prepare and clean the pipe according to the standards in the pipefitter's manual.
- Install the required fittings and compound while the pipe is on the threading machine or in a vise, when possible.

- Install each section of pipe, verifying squareness with the existing structures.

Example of Installation Squareness w/ Existing Structures



- Thread, glue, or weld each section of pipe into the fitting of the previous pipe. Verify that the appropriate pipe sealant is applied. If threaded, be careful not to over tighten the connection.

Note: Installing pipe may require two people, depending upon the length of the pipe and/or location of the installation.

Warning: If working overhead, warn all personnel in the area. It may be necessary to put up Danger signs and/or to rope off the area. Also, check the engineer's specifications for the number of supports required for a span of hanging pipe.

7. Continue measuring and installing until the system is installed.
8. Repeat process for additional products.
 - Follow steps 1-7 until all required piping is installed.
9. Test installation.
 - Test and operate the system. Be prepared to restore ZMS if leaks or faults are found in the system.
10. Follow the Maintenance Mechanic procedures to Perform Startup and Shutdown Procedures for the piping system.