Common Covered Task 007
Operate Valves

Directions

This training guide is to be used by a Veriforce Authorized Evaluator/Trainer and Trainee during on-the-job training (OJT) or prior to an evaluation as a resource. (S) Indicates a demonstration or skill task; (K) indicates a knowledge task.

OJT Reminder

OJT is an active hands-on process. Practice should be as similar to the actual job task as possible. However, if the training is being provided on an actual job site while a covered task is actually being performed, the Evaluator either needs to be qualified on that covered task or be assisted by someone who is qualified on the covered task. The Evaluator should closely monitor the Trainee's practices to ensure safe and correct task performance. At no time should a non-qualified individual perform, or train for, a covered task unless directed and observed by a qualified individual. However, if the ***"span of control"*** for that particular covered task is "1:0" (requiring only qualified individuals to perform the covered task), the training must be simulated. Training is simulated by "walking through" the task and simulating all actual manipulations (valves, switches, tools, etc.) an individual would use during the performance of a covered task. Simulating includes the use of safety and administrative requirements as if the task were being performed live. Refer to the Veriforce Evaluator Training Program for more on how to conduct formal OJT.

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Recommended Student Training or Resources:

- 1DOT 49 CFR 192.605(b)(5)
- 2DOT 49 CFR 195.402(c)(7)

Knowledge: Explain what is required prior to performing this task.

Prior to performing this covered task, you are required to have the following items:

- Pipeline operator-approved procedures
- Appropriate equipment and materials

Pipeline Operator-Approved Procedures

The pipeline operator-approved procedures will outline important information related to the operation of valves that you should be aware of before beginning the task.

Some of this information could include the location of the procedure, the type of valve involved, the pipe systems affected by the valve operation, specific instructions for your location and equipment, etc.

You should keep these procedures on hand during the task so you can refer to them throughout the procedure. This will help ensure the task is performed and completed in accordance with the operator.

Appropriate Equipment and Materials

You will also need to make sure you have the appropriate equipment and materials that are required for the specific job at hand before beginning this procedure. The type of equipment and material will vary depending on the piping system and operator requirements.

However, some common items you may need to perform this task could include the pipeline operator drawings and mechanical assist devices such as pneumatic wrenches and pull chains.

When using the appropriate equipment and materials, make sure you refer to the manufacturing guidelines. This will help ensure the equipment and materials are used properly.

Knowledge: Identify the most common types of pipeline valves.

Valves are used on many items and can be found just about everywhere. From automobiles to household appliances, you will more than likely find a valve. In fact, most of us use valves daily without even realizing that we are using a valve. We solely want to either turn on the flow of water in our sink, shower, or garden hose, or perhaps fire up our barbeque grill. Much like the valves that we use in our everyday life, valves in the pipeline also function with the same purpose: to control the flow of a product within the pipeline.

Unlike the simple use of a valve in a sink, prior to putting a valve into service or operating a valve attached to a pipeline, you must know what type of valve you are going to operate. There are several types of valves and valve manufacturers, and each has different design factors. However, regardless of type or manufacturer, all valves share some of the basic components. Some of these components are the casing, inlet and exit port, and an external control mechanism that moves the position of the internal flow control device.

The casing, which is also known as a housing or body, contains the flow control element and subsequent components. The inlet and exit ports allow for product to enter and exit the valve. This is also where the valve is attached to a pipeline.

Each valve also has some sort of external control mechanism. The external control can vary from a wheel to a male plug that requires a ratchet, or a pneumatic or electrical actuator.

While all valves may share some of the same types of components, the main difference that defines the specific type of valve is the internal flow c0ontrol device. Of the different types of devices, the most common found in the pipeline industry are the ball, plug, and gate mechanisms.

Of the types of valves, the most common types found for pipeline are the:

- Ball Valve
- Plug Valve
- Gate Valve

Ball Valve

The ball valve is a valve in the shape of a spherical disc. The sphere has a hole, or port, through the middle of the sphere. The disc and its port control the flow of a product in the pipeline.

When the hole is in line with both ends of the valve, flow will occur. This position represents an opened valve.

When the hole of the sphere is perpendicular to the ends of the valve, flow is blocked.

As stated previously, there are several types of valves and manufacturers. Within each type of valve, whether it's a ball, gate, or plug, there are also different variations of each. Ball valves generally vary in body construction and design. There are five general body styles associated with ball valves.

These different body styles are:

- Single
- Three piece
- Split
- Top entry
- Welded

In addition to the different body styles, ball valves can vary with how the ball is supported within the casing. Two of the most common ways the ball is supported in the casing are the trunnion and the floating mounted design. The trunnion mount is a design feature that supports the ball at the top and connects to the shaft. In addition, the ball also has the trunnion attached at the bottom of the ball for support.

The floating ball design is attached to the shaft at the top of the ball much like the trunnion design. The difference in this design is that the bottom of the ball is supported by seat rings. This support of the bottom of the ball gives it a "floating" characteristic.

The seat rings are usually manufactured from non-metallic materials or from a metal such as stainless steel. Seat rings that are non-metallic are referred to as "soft seats". Stainless steel rings are known as "metal seats".

In addition to how the ball is attached in the valve body, there are different styles related to the port/hole of the ball. The main difference is the diameter of the port/hole. The port size dictates the rate of product flow through the pipeline. The bigger the hole the more flow. A smaller hole will cause a more restricted passage resulting in reduced product flow.

Plug Valves

Plug valves are usually cylindrical or conically tapered in shape.

These plugs rotate inside the valve body to control flow through the valve, much like the ball valve.

Like the ball valve, the plug valve has ports/holes through the body.

The typical plug valve has one or more hollow passageways (ports) through the plug. The size of ports in the plug vary like the ball valve. The size and amount of ports are dependent upon the amount of flow required.

The ports in the plug valve allow for product to flow through the plug when the valve is open.

Plugs are designed to rotate within the valve. Like the ball valve, the plug valve can be opened or closed with a quarter turn of the external control mechanism.

Gate Valve

The gate valve, also known as a wedge or slide, is a valve that opens by lifting a round or rectangular gate or wedge out of the path of the product in the pipeline.

A distinct feature of a gate valve is the sealing surfaces between the gate and seats.

These surfaces are planar in shape, so gate valves are often used when straight-line flow and minimum restriction are desired. Also, this allows product pressure to help create a tighter seal.

The gate faces can either form a wedge shape or be parallel to one another.

Unlike the ball and plug valves, the gate valve is mainly designed to completely block or allow for full flow of the product that is introduced in the valve mechanism. As a result, the typical gate valve is not used for regulating the flow of product, unless the valve is specifically designed for that purpose.

Always refer to the valve's operating manual and the operator's instructions prior to utilizing this type of valve for anything other than fully opened or closed positions.

The ball and plug valves open and close by pivoting the disc/plug within the valve body, enabling them to be operated with a quarter turn. The gate valve typically must travel the diameter of the pipe to open or close. Therefore, opening and closing this type of valve may take longer due to the distance it must travel.

Skill:	Demonstrate how to open and close a valve.

Prior to operating a valve, you must first identify which type of valve you are working with.

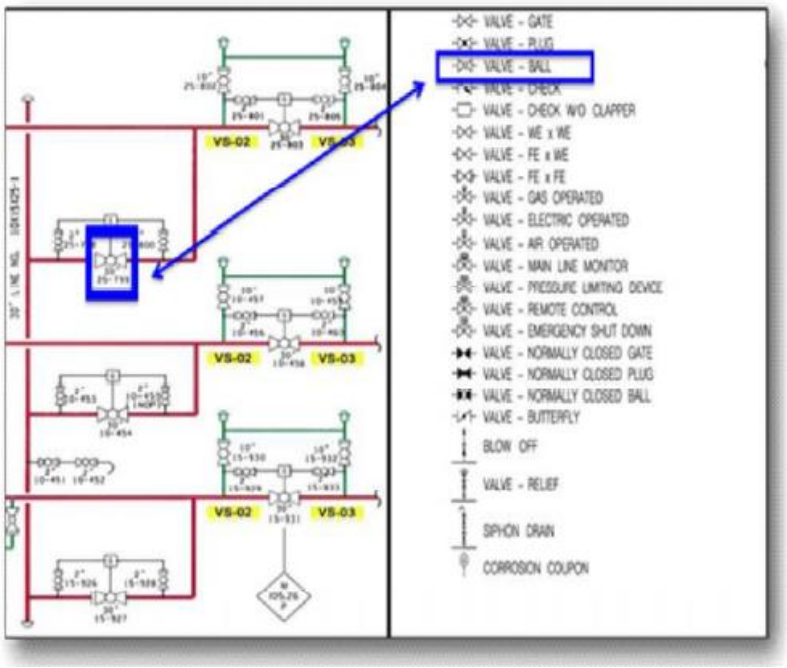
Valve discs (ball, plug, gate, etc.) are sealed within the casing of the valve body. Due to this design feature, you usually cannot tell which type of valve mechanism is enclosed.

If you are tasked to operate a valve or a series of valves, you will need to know the type, the location of the valve, and the specific operation to perform.

Each operator is required to maintain a list of each valve and valve location. To find the valve and type, you will need to be able to understand the operator's drawings. While each operator may have their own specific drawing and valve numbering preferences, they are all similar in nature.

The operators will have some sort of legend incorporated in their drawings that explains their specific valve/pipeline. The operator drawings will show a detailed diagram of the pipeline. Once you have the valve number that is assigned by the operator, simply locate the number on the map to find the valve location. Once you have physically located the valve, you should verify that you have the correct valve by checking the operator's valve sequence number to the number and legend on the drawings.

In addition to finding the valve on a pipeline and the specific valve type from the operator's drawing, you can also determine which type of valve you are working with by locating the manufacturer's nomenclature on the valve body. Like the operator's valve number affixed to the valve, the manufacturer's information will also be on a tag, sign, or stamped on the body. Ensure you do not confuse the manufacturer's information with the operator's valve sequence number.



If you cannot find any verifiable markings on the valve, you should always contact the operator to get the valve's specific information.

The operator should have this information on hand. If not, they can contact the valve vendor to obtain the valve's "MOM".

- M – manufacturer
- O – owners/operation
- M – manual

Once you have identified the type of valve and familiarized yourself with the location of the operating components, you can proceed to operate the valve.

The first step you should do in this process is to determine if the valve has a locking mechanism that prevents unintentional movement of the valve. If the valve has a lock on it, you will need to unlock the device prior to operating the valve. Always determine the position of the valve to verify if it is open or closed. Each valve is different in determining valve position. Some have an indicator on the body while others have a control box that shows the position.

Depending on the type of job, the operator may require you to document the position of the valve, both before and after operating the valve. Before opening or closing any valves, ensure the proper personnel are notified and that all associated operator procedures are followed. Valves can be operated manually or through the use of an operator (mechanical assist).

The method of operation for mechanical assist is determined by the type, manufacturer, and size of the valve.

In addition, operator's needs may also play a roll. For example, an operator may have the need to monitor and control the valve remotely through an actuator.

For valves with a wheel attached (external valve control), you simply turn the wheel either clockwise or counter clockwise to operate the valve.

Mechanical assist devices can come in several forms. For example:

- Pneumatic wrench
- Pull chain
- Pneumatic or electrical valve control actuator

Prior to using one of these types of devices, ensure you are familiar with its function. Always follow any specific guidelines the operator has set in place.

Upon completion of operating the valve, you should verify that the valve is in the desired position and secure the valve as appropriate by locking it.

Lastly, notify the operator of valve operation and document as required. Much like operating daily use valves such as a faucet in your house, the basic principles apply to valves on the pipeline with regards to product flow.

However, unlike everyday sink faucets, attention to detail and having a full understanding of a pipeline valve is a must.

Being able to properly identify and correctly operate a valve is imperative to ensure a safe and successful valve operation, and ultimately the integrity of the pipeline.

Abnormal Operating Conditions (AOCs)

Candidates are required to possess the ability to **RECOGNIZE** and **REACT** to the listed AOCs for each task. Be prepared to answer questions concerning additional AOCs that may be relevant. Evaluators may ask questions about AOCs throughout the evaluation.

An AOC is defined in **49 CFR §§ 192.803** and **195.503** as:

A condition identified by the pipeline operator that may indicate a malfunction of a component or deviation from normal operations that may:

- Indicate a condition exceeding design limits; or
- Result in a hazard(s) to persons, property, or the environment.

Recognize: Unintentional releases, vapors, or hazardous atmosphere could be signs that an abnormal operating condition has occurred. Examples could include, but are not limited to:

- Blowing gas
- Puddles
- Dead Vegetation

React/Respond: Proper reactions and/or responses to take in the event of an unintentional release, vapors, or hazardous atmosphere include the following:

- Eliminate potential ignition sources.
- Move to a safe location.
- Notify emergency response personnel, as appropriate.
- Notify the designated operator representative.

Recognize: Failure or malfunction of pipeline component(s) is an abnormal operating condition. Examples could include, but are not limited to:

- Operating mechanism refusing to move

- No indication of movement
- Outside force damage

React/Respond: Proper reactions/responses to take in the event of a failure or malfunction of pipeline component(s) include the following:

- Stop the activity.
- Notify the designated pipeline operator representative.

Recognize: Corrosion on a pipeline component that has impaired or is likely to impair the serviceability of the pipeline is an abnormal operating condition. Examples could include, but are not limited to:

- Stem corrosion that inhibits movement
- Excessive body corrosion

React/Respond: Proper reactions/responses to take in the event of corrosion on a pipeline component that has impaired or is likely to impair the serviceability of the pipeline include the following:

- Notify the designated pipeline operator representative.

Glossary

AOC
abnormal operating condition

CCT
common covered task

CFR
Code of Federal Regulations