

Common Covered Task 213

Joining of Metal Pipe and Components by means other than Welding – Threaded and Flanged Connections

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.

Disclaimer

This training resource is offered in good faith. Anyone choosing to utilize or rely on this training resource is doing so at their own discretion, risk and choice. Although every attempt has been made by Veriforce, LLC (the "Company") to ensure the correctness and suitability of this document and to correct any errors brought to the attention of the Company, the Company makes no representation or warranty regarding correctness or suitability (either directly or indirectly) of information referenced or implied within this training resource.

In no event shall the Company be liable for any damages (including, but not limited to, special, incidental or consequential damages) whatsoever (including, but not limited to, death, personal injury, damage to person or property, loss of use, and/or loss of revenues), whether in an action of contract, negligence, or other action, arising out of or in any way associated with the use or misuse of this document.

All critical information should be independently verified by the user and the user shall not rely on the contents provided herein without such independent verification. The subject matter included in this training has been compiled from a variety of sources and is subject to change without notice. The Company reserves the right to add, remove and alter information contained in this document without notice.

The Company may provide links to other sites for your convenience; however, the Company takes no responsibility and makes no representation or warranty regarding the accuracy or currency of information contained within such sites. The Company does not endorse any information, goods, or services referred to within such sites, and the provision of links by the Company shall not be interpreted to be an endorsement of such information, goods or services. The content of this training resource is provided for personal use only, and all other use, copying or reproduction of this training or website or any part of it is prohibited.

Common Covered Task 213

Joining of Metal Pipe and Components by means other than Welding – Threaded and Flanged Connections

Recommended Student Training or Resources:

- DOT 49 CFR 192.271
- DOT 49 CFR 192.273
- DOT 49 CFR 195.126

Knowledge: Explain what is required prior to performing task.

When joining metal pipe with either a threaded or flanged connection, you will need the following:

- Appropriate equipment/materials
- Operator-approved procedures

Equipment includes the tools needed to perform the task. Examples may include, but are not limited to, torque or pipe wrenches, sockets, and pipe dope.

Materials include the fittings or flanges themselves. After verifying that you have the correct piece, you must also ensure you have all the components needed for installation, such as gaskets and proper nuts/bolts.

It's also important to have and follow your operator procedures as they will specify how to install the components properly.

Skill: Demonstrate joining metal pipe with threaded connection.

When joining metal pipe with a threaded connection, verification of all materials is an essential process, and should be done prior to any installation.

Make sure the fitting is stamped with the **proper size, pressure rating, and/or other pertinent information** needed for the task.

Some fittings may **NOT** be stamped. If there is no stamp or marking, notify the designated operator representative for guidance on use.

Ensure that all necessary personal protective equipment (PPE) is available and used. PPE requirements may differ for each location; therefore, follow operator guidelines. Be prepared!

Failure to perform the next two steps could prevent the joint from **properly sealing**.

1. Ensure that the fitting is properly cleaned and free from debris. The preferred tool to clean a fitting is a wire brush. It may be necessary to wipe the wire-brushed threads with a clean rag.
2. Inspect all components for nicks or damage in the threaded area.

Once the fitting has been properly verified, cleaned, and inspected you are ready to apply the sealant material.

Sealing products are generally found in tape or paste form (also known as pipe-dope). Ensure sealing material is compatible with the intended application (e.g. temperature range, pipe materials, contents of carrier pipe) and approved by the pipeline operator.

When applying tape sealant to a threaded fitting:

- Hold the end of the tape flat against the male threads.
- Turn the pipe as though you were tightening it.

- Overlap the tape enough to hold in place, and then travel down to end of threads.
- As you continue to apply the sealant, cover the previous wrap until sufficient thread sealant is applied to ensure a leak free connection.
- Keep the tape flat and tight against the pipe as you turn.
- Ensure that the threads are fully covered.
- The reason for doing it this way is so the loose end gets pinned down by the action of screwing the pipe in, rather than getting flipped up.

When applying paste sealant to a threaded fitting, you should apply the paste evenly and liberally. Bare spots are not acceptable.

When applying sealing material **DO NOT ALLOW** the sealant to pass over the end of the fitting. Doing so could potentially introduce the sealant into the product; compromising the equipment.

Once the tape has been applied, immediately thread the pipe into the fitting. This can be done by hand or with the aid of a vise. Next, tighten the fitting with a pipe wrench and vise.

Caution: It is possible to over tighten fittings which may lead to a failure. The **number of times** the threaded fitting is to be tightened, and what constitutes "**tight enough**," is at the discretion of the pipefitter. Generally, it will only require one or two turns.

Once all components have been assembled and proper pressure has been applied to the system, apply a soap solution or similar product to check for leaks. If bubbles appear, there is a leak. Corrective actions should be taken to eliminate the leak.

Following the actions listed within this training module and operator specific guidelines will help ensure that the joining of metal pipe with a threaded connection will obtain the proper seal. Lastly, there is no substitute for hands-on training and direct trainer involvement. With that being said, this training is not intended to substitute any hands-on training.

Skill: Demonstrate joining of metal pipe by flanged connections.

A flange is a protruding rim, edge, rib, or collar on a pipe shaft. It is used to strengthen a pipe, hold it in place, or attach it to another pipe or object such as valves and tee connections. There are several different type and styles of flange connections. The most common found on the pipeline are bolted and threaded flange connections.

Prior to installing a flange on the pipeline, you must ensure that you have all the proper materials, to include the size, fitting, gasket, and correct rating of the flange materials.

Verify the flange ratings against the operator's written requirements and procedures to ensure the flange meets or exceeds the operator's requirements. Most flange components will be stamped or marked with the size, pressure rating, and other pertinent information. If there is no stamp or marking, notify the designated operator representative for guidance on use.

After you have verified that the flange meets or exceeds the operator's requirements, you will need to inspect the flange. At a minimum, the faces of the flange should be clean and free of any foreign debris. Additionally, you should inspect for any nicks or damage on the connecting face of the flange to ensure proper sealing.

The first step to installing the flange is to ensure both faces are aligned properly. Doing so will ensure correct fitment of the two sides being mated together and provide a proper seal. To align the flange, insert bolts/studs on the bottom portion of the flange, and install the component you wish to connect to the flange. This will aid in keeping the flange aligned while installing the gasket.

When inserting the gasket between the flange faces, care must be taken not to fold or damage the gasket. Any fold or misalignment will cause leaks in the flange. Once you have properly inserted the gasket, install the

remaining bolts/studs, and then secure them on the flange by screwing them in to a snug fit. Do not over tighten the nuts. The initial tightening should be hand tight or a snug fit at most.

After all the nuts are installed in a snug fit, you can begin to tighten them.

Note: Flange nuts should be tightened to specified value using proper sequence of tightening.

Ensure that all nuts are fully engaged. Fully engaged is generally defined as ensuring that the bolt threads extend completely through the mating nut.

To confirm that the flange has sealed properly, you will need to check for leaks. There are several products on the market available for detecting leaks, from ultrasonic devices to simple liquid based solutions. A common cost effective method for checking for leaks is to use a liquid solution, such as "Snoop," that will bubble around the area where a leak is present.

Flanges are invaluable to a pipeline system. They offer fairly quick and easy installation of valves, added pipe, and numerous other pipeline related materials. The proper function and integrity of the pipeline rests on your ability to properly comprehend and adhere to all manufacturer and operator instructions during the inspection, verification, assembly, and while checking for leaks. Lastly, there is no substitute for hands on training and direct trainer involvement. With that said, this training is not intended to substitute any hands on training.

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
- Vapors from casing vents

React/Respond: Proper reactions/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 designated operator representative.

Recognize: Material defects, anomalies, or physical damage of pipe or a component that has impaired or is likely to impair the serviceability of the pipeline are abnormal operating conditions. Examples could include, but are not limited to:

- Misalignment
- Gasket damage
- Damaged flange face
- Stripped threads

React/Respond: Proper reactions/responses to take in the event material defects, anomalies, or physical damage of pipe or a component that has impaired or is likely to impair the serviceability of the pipeline include the following:

- Stop activity and notify designated operator representative.
- Mark the location so it may be easily located.

Recognize: An unintended fire and/or explosion on or near the pipeline is an abnormal operating condition.

React/Respond: Proper reactions/responses to take in the event of an unintended fire and/or explosion on or near the pipeline include the following:

- Move to a safe location.
- Notify emergency response personnel, as appropriate.
- Notify designated operator representative.

Glossary

AOC

abnormal operating condition

CCT

common covered task

CFR

Code of Federal Regulations

OJT

On-the-job training