Common Covered Task 480
Apply Approved Coating by Hand Application

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.

Copyright © 2020 Veriforce, LLC. All rights reserved.

Common Covered Task 480
Apply Approved Coating by Hand Application

Recommended Student Training or Resources:

- DOT 49 CFR 192.461(a)
- DOT 49 CFR 195.557
- DOT 49 CFR 195.559
- DOT 49 CFR 195.581

Knowledge: Explain what is required prior to performing task.

Operator-approved procedures

Before beginning your task, consult with the Operator. They will provide some information, including, but not limited to, the type(s) of coating that will be used, the technique(s) that will be used, the required coating thickness (this can vary depending on where a section of pipe will be laid), and the section(s) of pipe to be coated. The Operator specifications or procedures may list other requirements, such as the type of primer and the type of top coat to use, if applicable. The Operator may have specific requirements on how to repair or replace the damaged coating based on the corrosion damage. Environmental conditions can also play a role in coating application selection. The Operator will also decide on the best coating type and application to protect the pipe.

Manufacturer procedures

Manufacturers provide product data sheets for you to use. Product data sheets vary from manufacturer to manufacturer but typically include pot life, mixing ratios, and surface preparation requirements. The Operator will also use the manufacturer's information to determine the compatibility of their coating with an existing coating. Be aware of any compatibility issues when one type of coating is used over another type as coating can bond to itself. It's important to follow the manufacturer's specifications for coating to coating compatibility. This will help prevent the need for re-coating.

You should always make sure that you have the most current product data sheets and read all specifications from the manufacturer beforehand. Sometimes a product data sheet is prepared for coating that would take place in the summer, so if you are coating in the winter, you would have irrelevant information. Proper surface preparation is important to the success of the coating's adhesion to the pipeline as well as the lifespan of the coating. The coating manufacturer procedures will contain instructions on surface preparation, and these instructions should be followed in order to obtain proper adhesion.

The manufacturer procedures will also include instructions regarding the method of application. Because coating application methods vary among manufacturers, it's important for you to review the specific instructions outlined by the manufacturer prior to performing the task.

Appropriate equipment/material

Appropriate equipment can include, but isn't limited to, holiday detectors (also known as a jeep), a sling psychrometric, a surface temperature thermometer, and a wet and/or dry film thickness gauge. Appropriate materials may include, but are not limited to, surface preparation equipment (approved filing tools, grinders, blasting, etc.), application equipment (rollers, brushes, etc.), coating, and approved solvent cleaners.

Remember, you should always be familiar with the tools and equipment you're operating. Always wear appropriate PPE and follow the applicable environmental and disposal requirements.

Knowledge: Describe factors to consider when applying coatings.

Copyright © 2020 Veriforce, LLC. All rights reserved.

Application method (example: brush, rolled, spray can)

When applying coating by hand there are many methods to consider. These include, but are not limited to: brush, roller, and spray can.

The brush application method should be undertaken using an appropriately sized, good quality, synthetic or natural fiber brush compatible with the product being applied. This application technique is relatively slow and is generally used for coating small areas. The roller application method is faster than using a brush and more suited for large surfaces. The length and thickness of the roller is dependent on the surface of the pipeline and coating itself. The spray can method, also known as a rattle can method, is a simple and inexpensive method for temporarily covering small jobs. Because the paint is thinned to come out of the nozzle, multiple coatings may be needed to build thickness.

Dew point reading at time of application

The dew point reading identifies the temperature at which the moisture in the air will condense as water on a solid surface. The pipe surface temperature must be measured to determine if it is above or below the dew point. In general, the pipe surface temperature should be at least 5°F above the dew point to ensure proper performance of the coating.

Since even the smallest amount of moisture can cause premature coating failures, you will need to take a dew point reading at the time of application by taking a reading of the ambient air temperature and the humidity reading. Then reference the dew point reading with the allowable manufacturer's minimum levels.

Pipe sweating

Applying a coating over the top of a wet surface will not allow the coating to bond directly on the pipe. Over time, this will cause blistering and lead to a failed coating, putting the integrity of the pipeline at risk. Just like a cold drink will sweat or form condensation on its surface when left at ambient temperatures, the same can occur to a pipe when the product inside the pipe is colder than the air surrounding it. This is often referred to as pipe sweating. Pipe sweating can be caused by general condensation from the environment or from the product flowing through the pipe. It's a symptom of excess moisture.

Ambient and surface temperature

Ambient and pipe surface temperatures play a role in curing times and pot life. Some coatings, such as two part epoxies, require surface and ambient temperatures to be within a certain range before mixing or applying the coating. You must ensure that you follow the manufacturer's instructions, and that the selection of the coating is compatible with the environment and operating temperatures of the pipeline.

Surface contaminates

Grease, oil, loose rust, welding slag, frost, moisture, mill scale, dirt, and other foreign debris can all rest on the pipe's surface and lead to contamination. If surface contaminates are left on the pipe, the coating will adhere to a layer of those contaminates instead of to the pipe itself. This can cause the coating to lift away from the pipe.

Airborne contaminates

High winds can change the curing times and can also cause debris to mix with the coatings during application. Airborne particles, dust, and foreign debris that are on the pipe or mix with the coating prior to coating application can cause air pockets. These air pockets will create weak points that cause coating failures, and can lead to holidays on the pipeline.

Weather conditions (current and forecast)

Try to schedule your coating applications on a sunny day. Avoid inclement weather whenever possible as it can affect the bonding. You should conduct readings for temperature, dew point, and humidity levels. These should be monitored every four hours during the coating process, or as outlined by the pipeline Operator and coating manufacturer's instructions.

Copyright © 2020 Veriforce, LLC. All rights reserved.

Knowledge:	Describe how to ensure the surface is properly prepared for coating application.

Verify surface is prepared per manufacturer's procedure

To ensure the surface of the pipe is prepared properly, use the recommended method for contaminate removal/surface preparation as outlined by the coating manufacturer. Manufacturers often use the standards developed by the Society for Protective Coatings (SSPC) and the National Association of Corrosion Engineers (NACE).

Verify surface is free of contaminates

There are different ways to make sure the surface is free of contaminates before applying the coating. These include, but are not limited to, solvent cleaning, hand tool cleaning, power tool cleaning, abrasive blast cleaning, and water blast cleaning.

Solvent cleaning is used for removing all visible oil, grease, soil, markings, and other soluble contaminates. It's essential to remove all surface contaminates prior to further surface preparation or painting of the steel. This method is often used prior to the other methods.

Power-assisted hand tools, such as a wheel grinder or a wire brush, are used to remove loose mill scale, rust, paint, and other loose foreign matter.

If the material you're trying to remove is bonded to the pipe, you may need to resort to other methods such as abrasive blast cleaning. This method uses abrasive materials, such as sand, metal, plastic beads, etc., by means of forced air.

Finally, there's water blasting, also known as water jetting. This method uses a power washer machine and can also use detergents and heated water to assist with cleaning. This method is a substitute to abrasive blasting when hazards, such as risk of fire, prohibit the use of abrasive materials.

Knowledge:	Describe the terms typically used in general manufacturer's recommendations pertaining to the application of coatings.

Pot life

The pot life is the period of time that a coating is usable. Pot life is a term used for two-part epoxies or coatings that require mixing components together. This mixing causes a chemical reaction to take place, which causes the components mixed together to start hardening.

Mixing ratios

The term mixing ratio is used for most two-part epoxies and indicates the amounts of components that are required to be mixed to create the coating. For example, mixing ratio instructions could say something along the lines of, "add one ounce of part A for every pint of part B." It's important to follow the product manufacturer's mixing ratio instructions.

Curing/drying times

The curing time is the amount of time that's required for the coating to completely dry and adhere to the substrate's surface. As the coating cures, it solidifies. If the coating isn't given the required curing time, it will fail to bond properly to the pipe. For curing to occur, heat, light, or a specific amount of time may be necessary.

Copyright © 2020 Veriforce, LLC. All rights reserved.

The drying time is the period of time that it takes for a coating to be dry to the touch. The drying time usually starts when the coating is applied to the pipe. There are a number of factors that can affect the amount of time it takes for a coating to dry, such as wind, humidity, temperature, and ventilation. As a general rule, the colder the temperature and the higher the humidity, the longer it will take for the coating to dry.

The product manufacturer will have curing and drying times for their specific product listed on the product data sheet. You should refer to the manufacturers recommended drying and curing times.

Re-coating

Re-coating is a term used for the application of a coating onto an existing coating. Because of coating differences, you should always follow the manufacturer's instructions when it comes to re-coating to avoid adhesion problems since this can eventually lead to coating failure.

Shelf life

The shelf life is the time frame in which a coating can remain in storage without the coating's serviceability being affected. The shelf life is based on the coating being in a tightly-sealed container that's stored within the temperature range set forth by the manufacturer. If the temperature range exceeds the manufacturer's recommendations for storage, the shelf life can be reduced drastically.

Skill: Demonstrate how to properly prepare for coating application.

Measure surface temperature of component

It's important to obtain the surface temperature of the pipe segment or component to be coated. Coating can require the pipe or component to be within a specific temperature range. Typically, you'll get the surface temperature by using a non-contact infrared thermometer. These are often called temperature guns. You will simply point the device at the pipe or component and pull the trigger to get a reading. This method helps prevent surface contamination or further coating damage when obtaining temperatures due to the fact that no contact is made. A second method of obtaining a surface temperature is using a contact thermometer. This may not be a preferred method for obtaining surface temperatures. When using contact thermometers, the probe will have to actually make contact with the pipe or component. This can lead to contamination or even coating damage, such as scratches.

Determine dew point

Determining the dew point is critical when applying coating. Typically, coating specifications require that the surface temperature of the component or pipe segment be at least 5°F higher than the dew point temperature. Dew point can be determined using the dew point meter that will perform the calculations or by obtaining the relative humidity and the dry bulb temperature, also known as the ambient air temperature, and then referring to a dew point chart.

Ensure area to be coated is free of contaminates

For the new coating to adhere, the surface must be properly cleaned. Typically, this process involves media blasting the area to be repaired and wiping down with an appropriate solvent before coating. Coating specifications may call for a particular blasting media to ensure the correct surface profile for proper adhesion. Other options include using sandpaper, a sanding wheel, or wire wheel. You will need to consult the product specifications for the proper grit rating when using these methods to ensure a proper surface profile. While acetone is a common solvent used for preparation, the manufacturer may specify a particular degreaser/cleaner.

Prepare coating (example, but not limited to, mixing epoxy), as applicable

Typically, coating will require some method of preparation before application. Coatings may be a single component in need of stirring, while others will consist of two parts that require proper mixing ratios. For

Copyright © 2020 Veriforce, LLC. All rights reserved.

example, a two-part epoxy will require measuring out the correct amount of resin and hardener and then mixing as recommended. Always refer to the manufacturer instructions for your particular coating.

Skill:	Demonstrate the proper application of coating using each of the following methods

Brushing

Using brushes to apply coating to a large area can be time consuming due to their size. Brushes are typically used for minor patch and repair work. They can also be used to stripe coat hard-to-reach areas and surfaces, such as crevices, bolts, rivets, corners, and welds. If you're going to use a brush, you need to be sure that you choose the correct type of brush since some brushes are designed strictly for water-based coatings, while others are designed specifically for oil-based coatings. To apply coating with a brush, you first want to cover the bristles with the coating and spread the coating on the pipe in one direction with moderate, even pressure. Avoid runs and sags in the coating, especially at the 6 o'clock region of the pipe. Keep an eye on weld buttons when using the brush method. Remember to work dry-to-wet, meaning you should coat from the uncoated area towards your newly-coated section.

Rolling

Rolling can be used for small sections or repair work. It offers faster application than a brush and applies the coating more evenly. Before using the roller, you should remove any loose fibers from the cover by "wiping" the roller cover with your hand several times. Follow the manufacturer and Operator's specifications regarding the roller size. To use a roller, saturate the fibers on the entire roller with the coating using a paint tray. Be careful not to oversaturate the roller. After saturating the roller, roll it on the pipe in a straight line to transfer the coating onto the substrate. Rollers work best on smooth surfaces and serve as a good alternative over a spray method in windy conditions.

Aerosol

Aerosol spray cans come in handy for small touch up jobs, although they may not be appropriate in windy conditions. The aerosol application method requires very little preparation and little to no mixing. Commonly referred to as "rattle cans" they can be color matched to your specific pipeline or component

Apply coating to achieve proper thickness

Regardless of the application method, you always want to minimize sags and runs and provide adequate coverage in angles and crevices. It's important to provide a reasonably uniform coating. This may require multiple coats.

Measure coating thickness to confirm proper application

Coating has a required thickness that must be met to ensure the coating functions as designed. The two most common types of measuring coating thickness are dry film and wet film measurements. Measuring dry film thickness typically involves the use of non-destructive measuring devices, such as magnetic pull-off gauges, electromagnetic induction meters, and ultrasonic gauges (UGT).

These are designed to be used on cured/dried coating. Always follow the manufacturer's instructions of each device to ensure proper use. The wet film method is used when the coating is still wet. This measurement is taken to ensure the correct amount of coating has been applied. It allows for corrections to be made before the coating dries. The wet film thickness gauge is a notch-type gauge. It has progressively deeper notches which resemble a hair comb. It's designed to be inserted into the coating and measure the thickness as it covers the teeth of the "comb." Whichever method of coating measurement is used, you should confirm with the Operator and/or the coating manufacturer's specifications regarding coating thickness requirements to ensure a proper application.

Copyright © 2020 Veriforce, LLC. All rights reserved.

Knowledge: Explain how to protect coating during curing/drying.

Tarps

Tarps are used to provide coverage over the area that has been repaired. This provides coverage from rain and dust/debris on the top and both sides. Tarps typically resemble a tent and can be large enough to work under or designed to just cover the repair spot during curing/drying. You will need to ensure that the tarp does not come into contact with the pipe during curing/drying. This can be done using some type of support.

Lean-tos

Another type of protection that can be provided is a lean-to using a tarp and some type of pole. The tarp is weighted or staked on one end and then propped up on the other. This provides coverage of the top and on one side. This type of cover does tend to leave one side exposed as well as the openings on the ends of the pipe, like the tarp tents. Again, you need to ensure that the cover does not come into contact with the wet coating.

Canopies

A third type of protective structure is a canopy. These are sometimes considered the easiest to erect because the materials (poles, cover material) are included. You simply open up the canopy and extend the legs. Although they are more convenient to use, they only provide cover to the top of the pipe segment. The sides and ends of your repair segment will be exposed to the elements.

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 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 designated operator representative.

Copyright © 2020 Veriforce, LLC. All rights reserved.

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 include, but are not limited to:

- Damaged risers
- Exposed pipeline
- Dents
- Gouges

React/Respond: Proper reactions/responses to take in the event of 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 are 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.

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

- Valve leaking
- Pipe support failure

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

- Stop activity.
- Notify designated 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:

- Evidence of damaged coating or loss of adhesion
- Notable metal loss
- Evidence of excess soil stress

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

- Notify designated operator representative.

Glossary

AOC
abnormal operating condition

Copyright © 2020 Veriforce, LLC. All rights reserved.

CCT
common covered task

CFR
Code of Federal Regulations

Copyright © 2020 Veriforce, LLC. All rights reserved.