Installation Instructions for Underground Kleerwater™ Oil Water Separators

October, 2007

Notice:

- Kleerwater™ underground oil water separators shall be installed by personnel who have the proper knowledge and experience in the proper and safe way to install these systems.
- These instructions are a supplement to the installation instructions for underground tank technologies, such as cathodically protected, composite or jacketed secondarily contained.
- These Kleerwater installation instructions along with the accompanying installation instructions compose a complete installation guide for the oil water separator.
- The Kleerwater separator must be installed within one year of delivery from the manufacturer. If the separator is not installed within this time period, contact the manufacturer for further instructions.

1.0 General

1.1 When the separator is shipped with a vacuum from the manufacturer, read the vacuum gauge. If the reading is below 5.3" of Hg, contact the manufacturer for further instructions.

1.2 Inspect the separator when it arrives for general appearance and verify that all of the components are present. If the tank is damaged or there are components missing, contact the manufacturer immediately for further instructions.

1.3 The separator shall be air pressure tested for leaks prior to installing the tank.

1.3.1 The temporary plastic plugs and thread protectors shall be removed and properly discarded. Apply compatible, non-hardening pipe sealant to the internal threads. Permanent metal plugs shall be installed in any unused openings.

1.3.2 Do not remove the manufacturer installed dielectric bushings or flange isolation kits from any of the openings. These bushings or flange isolation kits have been installed by the manufacturer to maintain isolation with the specific tank technology. Care shall be taken not cross thread or damage the dielectric bushings or flange isolation kits when replacing plugs or installing the required piping.

1.3.3 **Single Wall Tanks**: Air pressure test the tank aboveground is required. Pressurize the tank to a maximum of 5 psig. While holding pressure, apply leak detection solution, such as soap solution, to all weld seams and fittings and inspect for leaks. If no leaks are detected, release the pressure and continue to install the tank. If leaks are found, they must be investigated, resolved, and the tank retested prior to continuing. Never vacuum test a single wall tank.

1.3.4 **Dual Wall Tanks**: Pressurize the inner tank to not exceed 5 psig. Seal the inner tank and disconnect air supply. Monitor the air pressure in the tank for a period of a minimum of one hour. If the pressure remains stable, pressurize the interstice with the air from the inner tank. Use a separate pressure gauge to monitor the pressure in the interstice. While holding pressure, apply leak detection solution, such as soap solution, to all weld seams and fittings of the exterior tank and inspect for leaks. If no leaks are detected, release the pressure off the interstitial space first, then release the pressure off the inner tank.

1.3.5 **Jacketed Secondarily Contained Tanks**:

1.3.5.1 Vacuum testing of the interstitial space of a jacketed secondarily contained tank can be performed instead of a pressure test. Do not apply a vacuum to the primary (inner) tank or a single wall tank. PEI Recommended Practice 100 also provides guidelines.

1.3.5.2 Apply maximum of Establish vacuum of 6 inches Hg (23.7 kPa) within annular space.

1.3.5.3 When the 6 inches Hg (23.7 kPa) is obtained, turn off pump, close valve assembly, and allow vacuum to stabilize. If vacuum drops by 1 inch Hg (3 kPa), in annular space, reestablish vacuum to 6 inches of Hg (23.7 kPa). This process may take several attempts.

1.3.5.4 Vacuum must be maintained at 6 inches Hg (20.3 kPa) for at least one hour. NFPA 30 states that the required vacuum of 5.3 inches Hg (17.9 kPa) or more shall be held for one hour, minimum.

1.3.5.5 If at the end of the one-hour test duration, the vacuum reading has remained at 6 inches of Hg (23.7 kPa) or greater, the 5.3 inches Hg (17.9 kPa) test criteria has been met and the tank has passed the tightness test.

1.3.5.6 Remove testing equipment and reestablish tank system to operating conditions.

1.3.5.7 NEVER leave the separator tank unattended during a test. Use all necessary safety precautions during testing.

2.0 Preparation

2.1 The excavation shall be free from any hard or sharp material that may cause damage to the separator tank coating or jacket. Care shall be taken during installation such that foreign matter is not introduced into the excavation or backfill.

2.2 The bottom of the excavation shall be covered with pea gravel, clean sand, or No. 8 crushed stone (No. 8 coarse aggregate per ASTM D448) to a depth of one foot, properly graded and leveled.

2.3 The excavation shall extend approximately one foot around the perimeter of the separator tank, ensuring there is enough clearance if the tank should have sacrificial anodes.

2.4 Where the tank is to be anchored directly to a concrete slab, the tank must not be placed directly on the slab. A 6-inch layer of pea gravel, clean sand, or No. 8

crushed stone must be spread evenly over the entire slab to separate the separator tank from the slab.

2.5 If the separator is located in a tidal area, the tank bedding should be pea gravel or No. 8 crushed stone. Fabric lining should be used if there is a possibility of backfill migration during tidal fluctuations.

3.0 Setting the Separator

3.1 Equipment to lift the separator shall be of adequate size to lift and lower the separator into place without dragging the separator.

3.2 Cables or chains of adequate strength shall be attached to only to the lifting lugs. These cables or chains shall be of the proper length such that the included angle formed by the cables or chains is less than 45^0. A spreader bar should be used if necessary. Chains, cables or slings shall not be used around the separator shell. **The separator shall be placed level and plumb for proper operation.**

4.0 Anchoring

4.1 High water tables or partially flooded excavation sites exert significant buoyant forces on separator tanks. Buoyant forces are partially resisted by the weight of the separator tank, the backfill, and the pavement atop the separator. Additional buoyant restraint when required is obtained by using properly designed hold-down straps in conjunction with concrete hold down slabs or deadman anchors.

4.2 If a metallic hold-down strap is used, a pad of inert insulating dielectric material must be used to insulate the hold-down strap from the separator. The separating pad shall be wider than the hold-down straps, which will prevent direct contact between the straps and the separator tank. This pad is not required if the hold-down strap is fabricated from non-conductive material.

5.0 Backfilling

5.1 Prior to starting the backfilling process, ensure that the anodes on the ends of the separators (if applicable) are thoroughly saturated with water. (This is not required on composite or jacketed tanks.)

5.2 Backfill around the separator using the same backfill material that was used in the bottom of the excavation. Do not pour backfill directly on the separator as this can cause damage to the coating. The bottom half of the separator shall be backfilled by shoveling and tamping to ensure the bottom of the separator is evenly supported. **The separator must remain level and plumb throughout the backfilling process.**

5.3 Continue to backfill around the separator to within 3” of the top of the separator.

NOTE: If the tank has inlet and outlet flanges on the ends of the tank, backfill up to just below the bottom of the flanges so the inlet and outlet piping can be installed.

5.4 The separator shall be ballasted with clean water to within 1 foot of the top of the vessel as soon as the separator is in place. Check the tank again for level.

NOTE: If the tank has inlet and outlet flanges on the ends of the tank, the separator shall be filled with clean water to where water just starts to come out of the flanges, then stop filling.

6.0 Piping and Attachments

6.1 The inlet piping leading to the separator shall be sloped a maximum 1/8" per foot of piping towards the separator to maintain gravity flow. The inlet piping should be installed straight and true with as few elbows as possible. Turns and drops create turbulence which minimizes the effectiveness of the separator. If elbows are required, try to maintain at least 20 pipe diameters of straight pipe away from the separator.

6.2 It is recommended that an isolation valve be installed on the inlet piping prior to the separator for future maintenance, safety, and emergency situations. If this valve is installed, it must be easily accessible by the owner or designated maintenance personnel.

6.3 The outlet piping leading away from the separator shall be sloped a maximum 1/8" per foot of piping to maintain gravity flow.

6.4 It is recommended that an isolation valve be installed on the outlet piping after to the separator for future maintenance, safety, and emergency situations. If this valve is installed, it must be easily accessible by the owner or designated maintenance personnel.

6.5 Attach separator tank manway extensions, taking care not to damage the manway gaskets.

6.6 Install vent lines on the inlet and outlet pipes and manways. These vents shall be piped independently from one another and vented directly to atmosphere. Only manway vents may be manifolded together as one common vent to grade level

6.7 For separator tanks with gravity oil skimmers, install oil skimmers and piping. Piping between the separator tank and the waste oil tank must be sloped a maximum 1/8" per foot towards the waste oil tank to maintain gravity flow.

6.8 For tanks with oil level sensors and pump out pipes, install riser pipes using compatible non-hardening sealant, taking care not to cross thread or damage the non-metallic bushings, if applicable. Ensure the pipes are fully inserted.

6.9 Refer to enclosed manufacturers sensor and control panel wiring diagrams and installation instructions for the control system into the separator. If there are any questions or problems understanding the control system installation instructions or wiring diagrams, give the tank manufacturer a call for further clarification and instructions.

6.10 The thread protectors on all unused openings shall be removed. The non-metallic bushings shall not be removed from these openings. Permanent metallic plugs shall be properly installed with non-hardening sealant.

6.11 At this point, all piping should be installed and all flanged connections should be completely tightened.

7.0 Final Air Pressure Test

7.1 When an air or hydrostatic test is required after installation, the pressure shall not exceed 5 psig and measured at the top of the separator tank.

8.0 Corrosion Monitoring System Installation (Cathodically Protected Tanks)

8.1 Each separator tank that is cathodically protected and has a cathodic protection monitoring station installed on the tank. This, in general, is the PP2 test wire that is attached to the tank. Locate this wire.

8.2 Select a location on a pipe which will be accessible at grade, either in a manhole or other at-grade box.

8.3 Loosen the black nylon pipe lashing. Uncoil enough test wire from the separator tank mounting lug or bracket to reach the location at grade with an additional 5 feet of slack.

8.4 Secure the PP2 test wire to the pipe by tightening the black nylon pipe lashing. Ensure the test wire does not anything metallic.

8.5 Do not cover the PP2 test wire with backfill material.

8.6 At this point, check to make sure there is no continuity between the tank and any of the connections which were made to the tank, such as piping (internal or external), valves, pumps, control systems, and grounding systems. A continuity test using the PP2 test wire and each connection will verify if there is proper isolation.

9.0 Final Backfill

9.1 Homogeneous backfill shall be carefully deposited around the separator. Do not deposit the backfill directly onto the tank as this can damage the external coating. Backfill to a depth of at least one foot over the tank to avoid damage to the coating, especially where tamping is required.

9.2 Continue to backfill over the separator until grade level is reached.

10.0 Final System Adjustments

10.1 Finish filling the separator tank with clean water until water is discharged from the outlet piping. The tank must be completely full of water to operate properly.

10.2 If inlet and outlet isolation valves are installed open the valves to the required amount so that the influent flow rate will not exceed the unit's maximum rated flow capacity. If there are no isolation valves, proceed to step 10.2.

10.3 For separator tanks with gravity oil skimmers, adjust the skimmer while the water is flowing through the separator tank. Adjust the skimmer so the openings are not submerged and the weir on the skimmer is set properly at the water crest.

11.0 Final Corrosion Monitoring System Check (Cathodically protected tanks)

11.1 All separator tanks must be monitored to assure proper installation and ensure cathodic protection of the separator tank. Monitoring shall be performed with a high impedance voltmeter. The voltmeter should be placed on the 2V DC scale. The test is done by using a copper/copper sulfate reference electrode placed in moist backfill above the separator tank and connecting it to the negative (common) port of the voltmeter. The positive lead is then contacted with all of the PP2 wire. A reading of –0.850V or more negative must be obtained to indicate the cathodic protection system is working properly. Record this reading and place it with the permanent files to remain with the owner and on-site.

11.2 Continuity should be checked again with a high impedance voltmeter. The voltmeter should be placed on the 2V DC scale. The test is done by using a copper/copper sulfate reference electrode placed in moist backfill above the separator tank and connecting it to the negative (common) port of the voltmeter. The positive lead is then contacted with all of the metallic structures connected to the tank. Do not move the reference cell at all during this test. The meter reading on these structures must be at least 0.003V, preferably 0.010V, different than the reading that was obtained in 11.1, to verify there is no continuity to the tank. Record these readings and place it with the permanent files to remain with the owner and on-site.

OIL LEVEL CHART FOR KLEERWATER™ OIL WATER SEPARATORS

Determine Oil Level during periods of no water flow to the separator and with separator liquid level at the minimum operating level.
- Separator must be operated at least at the minimum operating level. If the liquid level in the separator is below the minimum operating level, fill separator with clean water until the minimum operating level is reached.
- Water Level can be determined by using water indicating paste on a tank gauging stick and finding where the indicating paste did not change color. The level where the paste did not change color is where no water exists.

Oil Level = Min. Operating Liquid Level – Water Level in Tank = X inches

Separator Size (Gal)	Tank Diameter (in)	High Oil Level (inches from tank top)	High-High Oil Level (inches from tank top)
150	30	5.5	12.0
285	38	8.0	14.0
550	42	9.0	15.0
700	48	11.0	18.0
1,000	48	11.0	18.0
2,000	64	14.5	23.5
2,500	64	14.5	23.5
3,000	64	14.5	23.5
4,000	64	14.5	23.5
5,000	72	16.0	25.5
6,000	72	16.0	25.5
8,000	84	18.5	31.0
9,000	96	21.0	35.0
10,000	96	21.0	35.0
12,000	96	21.0	35.0
15,000	96	21.0	35.0
20,000	120	27.0	46.0
25,000	126	28.0	46.0
30,000	126	28.0	46.0