



OPW[®]

FUELING CONTAINMENT SYSTEMS

Tank Sump Manual

Product Manual * Publication Number: TSM-0001 * Issue Date: 04/20/11
Supercedes: 05/27/09

FlexWORKS
BY OPW FUELING CONTAINMENT SYSTEMS



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1.0 FLEXWORKS

The FlexWorks System requires the use of tank sumps as a means of secondary containment of a tank's pump, valves and piping connections. These units extend from the top of the tank to just below the street manhole cover. They serve as a liquid tight isolation chamber, preventing ground water from entering and any leaking product from escaping into the environment. Tank sumps are non-corrosive, chemically compatible and are structurally suitable for underground burial applications.

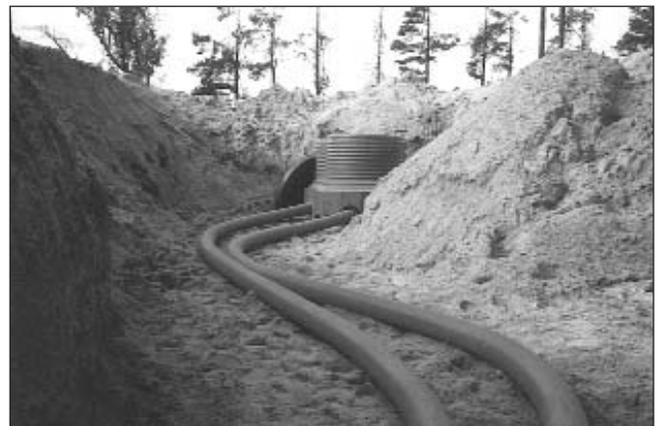
All tank sumps are made of non-corrosive materials which are chemically compatible and excellent for soil burial applications. All tank sump models have height adjustable risers to accommodate different tank burial depths. Each tank sump model has its own specific range of height adjustability.



Tank sumps must be fabricated and also assembled at the job site. Upon delivery, make sure there is no visible damage to the sump and all sump components are contained within the sump. Failure to comply with these installation instructions shall void the Product Warranty.

1.1 General Information

This product manual contains useful information about all models of tank sumps. It is recommended that this manual be read prior to specifying and installing tank sumps. Installation practices should comply with the installation instructions contained within this product manual in order for the product or system warranty to be valid.



1.2 Independent Testing

All OPW-FCS one and two piece tank sumps and piping sumps are listed with Underwriters Laboratories, Inc., (UL®). These sumps were tested in accordance with UL's "Standard Testing Procedure for Underground Dispenser Sumps and

Tank Sumps.” These components are listed under file #MH 19391. The scope of the tests include broad compatibility testing for both petroleum products and burial environments as well as physical testing to confirm the sumps’ structural integrity and liquid tightness.

1.3 Liquid Tightness

All tank sumps and accessory components are designed to prevent any external liquids from entering the sump, and liquids originating within the sump from escaping into the surrounding environment. Compliance with the tank sump installation procedures are especially important in high ground water applications. Assembly and installation instructions must be followed to ensure the liquid tightness which is paramount for environmental safety. OPW-FCS recommends hydrostatic testing on all sumps after installation to verify proper sealing of joints and connections.



1.3.1 Sump Covers

All tank sumps are equipped with a watertight sump cover, one style which does not require the use of fasteners to affect a liquid tight seal, the other with knobs to achieve proper compression and sealing capabilities. For added protection for compression style lids, optional hold-down latches are available to secure the lid firmly to the sump riser in high water table applications.



1.3.2 Pipe & Conduit Entry Seals

OPW-FCS’s flexible entry boots are the only type of sump entry seal permitted for warranty coverage. These composite rubber/metal type compression seals are installed in the wall of the tank sump and provide a watertight connection for all pipe and conduit entries.



1.4 Structural Integrity

Properly selected materials combined with a structurally enhanced design allow tank sumps to resist the forces associated with backfill, high ground water, and ground movement. All polyethylene sumps are rotationally molded of a high density polyethylene (rotational grade), which is a very durable and crack resistant semi-rigid plastic. The multi-sided and ribbed base, the ribbed riser section and the graduated riser to base step section further contribute to the overall strength of the sump.

1.5 Chemical Compatibility

All tank sumps are made of high density polyethylene or fiberglass. Both materials are essentially inert and each

has a long history of underground burial applications. These materials have been used for the storage of a long list of chemical solvents as well as hydrocarbon and alcohol based fuels.

All pipe entry seals are made of a specially formulated PVC-Nitrile compound which has been independently tested to insure its compatibility with a wide assortment of chemicals. These tests include measuring the material’s retention of properties as well as its physical characteristics of the seal after exposure.

1.6 Corrosion Resistance

All metal components used for sump connections and sealing are either zinc or nickel plated, or made of stainless steel. All metallic components are accessible from inside the sump.

The sump and associated seals are non-metallic and should not corrode.

2.0 SPECIFYING TANK SUMPS

Tank sumps are available in a variety of styles and sizes to accommodate most tank fitting configurations and tank burial depths. All sumps also feature patented watertight covers. All tank sumps are made of either polyethylene or fiberglass, both of which are compatible with all fuels and will not crack or break under burial loads. All tank sump models have height adjustable risers to accommodate different tank burial depths.



2.1 Shallow Burial Tank Sumps

A one piece polyethylene containment sump designed for tank burial depths between 21” and 37”. Available in sizes to install under 36” and 42” diameter street boxes.

2.2 Standard Burial Tank Sumps

A one piece polyethylene containment sump designed for tank burial depths between 24” and 44”. Available in sizes to install under 36” and 42” street boxes.

2.3 Deep Burial Tank Sumps

A one piece polyethylene containment sump designed for tank burial depths between 29” and 55”. Available in sizes to install under 30”, 36” and 42” street boxes.

2.3.1 Fiberglass Tank Sumps

Available in one or two piece, fiberglass tank sumps are designed for deep tank burials between 41” and 55” having high groundwater conditions and/or sand backfill. Available in sizes to install under 36” and 42” diameter street manholes.



2.4 Junior Burial Tank Sumps

A small polyethylene containment sump used for containment of miscellaneous tank valves and fittings. This containment sump is of a one

piece construction.

2.5 Inline Piping Sumps

A small polyethylene containment sump available for containment of miscellaneous tank valves and fittings. This containment sump is of a one piece construction.

2.5.1 Transitional Piping Sumps

Provides containment of pipes and fittings for transitions of above grade rigid pipe to flexible pipe below grade. Refer to the transitional piping sump product data sheet for details and installation instructions on this sump.

3.0 SUMP PIPING APPLICATIONS

Flexible underground piping systems can be configured in a variety of arrangements depending on the application and dispensing specifications of the service station. Tank sumps are used to contain a variety of fittings for both pressure and suction piping applications. The following describes both piping applications.

3.1 Pressure Piping Applications

Tank sumps used in this application would typically contain the tank's submersible pump and other associated fittings. Here, the FlexWorks piping connections to the pump would be contained as illustrated.

3.2 Suction Piping Applications

Tank sumps in this application would typically contain the tanks instrumentation and other associated fittings. Here, the FlexWorks piping connections are contained as illustrated.

4.0 TANK SUMP INSTALLATION STEPS

A listing of the basic installation steps for tank sumps is provided in chronological order for easier clarification of detailed installation instructions contained within this manual.

- Step 1:** Mount tank sump base to the tank.
- Step 2:** Install flexible entry boots.
- Step 3:** Install pump and piping connections.
- Step 4:** Mount riser to sump base (if required).
- Step 5:** Install water tight Sump Cover.
- Step 6:** Install manhole cover.

5.0 TANK SUMP MOUNTING APPLICATIONS

Tank sumps are designed to mount to the top of an underground storage tank in a variety of applications. Listed

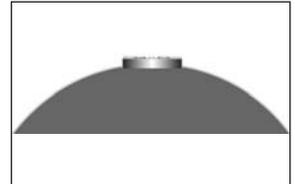
below are the approved and warranted applications:

5.1 Tank Flat-Tops

Tanks may be equipped with a flat circular surface area containing an arrangement of tank fittings. A bolt circle of metallic studs surround the top and can be used to mount the tank sump by using the flanged collar adapter.

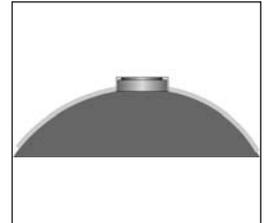
5.2 Flanged Containment Collars

Tanks may be equipped with an inward facing flanged containment collar which generally encircles a varied arrangement of tank fittings. Tank sumps may be directly mounted to these collars using a flanged collar adapter.



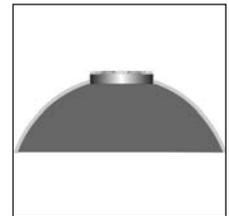
5.3 Inward Flanged Manways

Tanks may be equipped with an inward facing flanged manway which has an arrangement of tank fittings on the manway cover. A bolt circle of metallic studs surrounds the manway for mounting tank sumps using the flanged collar adapter.



5.4 Vertical Containment Collars

Tanks may be equipped with a vertical fiberglass containment collar which generally encircles an arrangement of tank fittings. Tank sumps having the fiberglass base can be directly mounted to the fiberglass containment collar by using the fiberglass resin kit.



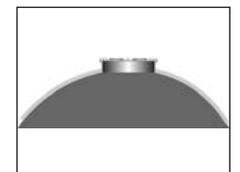
5.5 Outward Flanged Manways

Tanks may be equipped with an outward facing flanged manway which has an arrangement of tank fittings on the manway cover. A bolt circle of metallic studs are used in securing the cover and attachment of the tank sump using the tank manway adapter.



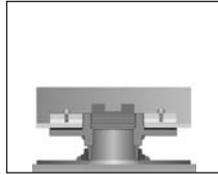
5.6 Conventional Tank Fittings

For tanks which are equipped with female bung fittings having tapered threads, tank sumps can be directly mounted by installing the tank fitting adapter. Tank fitting adapters are available in both 4" and 6" NPT fitting sizes. Two tank fitting adapters are recommended in each tank sump.



6.0 SUMP BASE MOUNTING INSTRUCTIONS

The installation of tank sumps must be performed by a trained installer. The means of mounting the tank sumps to the top of underground storage tanks are dependent upon the design and construction of the tank. The following sump base mounting instructions cover a wide variety of mounting applications, each of which requires the sump base to be fabricated in some manner.



When determining the alignment of the sump base to the tank fittings, it is important to consider the size, height, and location of the submersible pump to ensure that it does not interfere with the wall of the riser section. The tank fittings must be no less than 10" on center if tank fitting adapters are to be installed. It is also important to consider in advance the location of piping penetrations through the sump wall. Failure to do so may result in excessive stresses on the piping joints and/or severe entry angles.

6.1 Flanged Collar Adapters

Should the tank sump require mounting to a tank's flat top, inward flanged containment collar or inward flanged manway, the flanged collar adapter must be used. Follow these fabrication and mounting instructions to comply with the product warranty.



If your tank manufacturer does not supply this type of collar as a standard component, then it will be necessary to request a custom collar be installed. The dimensions and design of the containment collar should be as illustrated and described below.

Dimensions:

- Bolt Hole Circle: 38 1/2"
- Number of Bolts: 24
- Bolt Diameter: 3/8"

Assembly Components:

- 8 - Compression Ring Segments
- 1 - Flat Rubber Ring Gasket
- 24 - 3/8" Bolts
- 48 - 3/8" Washers
- 24 - 3/8" Nuts
- 1 - Roll of adhesive tape

6.1.1 Sump Base Layout

Turn the sump base over so that its bottom is facing up. Assemble the segmented compression ring onto the sump base evenly. Then center the assembled ring on the sump base using the fabrication guidelines. Beginning with a permanent ink marker, trace the inside

circle of the segmented ring. Remove the segmented ring from the sump base.

WARNING: Verify dimensions of flanged collar prior to cutting sump.

6.1.2 Cutting Out Opening

After tracing the inside circle of the segmented compression ring, cut out the opening using an electric saber saw fitted with a cutting blade suitable for cutting plastic. Cut out the inside circle traced on the bottom of the sump base. After cutting out the opening, clean the edges using a razor knife if necessary.



6.1.3 Outside Bolt Circle Drilling

Proceed to reassemble the segmented compression ring on the sump base evenly. Center the assembled ring on the inside edge of the cut-out opening. Mark the center of the holes in the segmented compression ring with a permanent ink marker. Using an electric drill fitted with a 9/16" bit, drill out the 24 bolt holes.

6.1.4 Base/Collar Assembly

After applying the adhesive tape to the collars flange, place the flat gasket over the collars' flange. Once complete, place the sump base over the gasket and align bolt holes. From inside the sump, install a compression ring section on top of the sump base's flange. Secure the ring section to the flange with fasteners. Install the remaining segmented compression rings and tighten all fasteners to 60 inch pounds.

WARNING: Underside of sump base and gasket must be clean and free of debris prior to mounting sump.

6.2 Fiberglass Tank Sump Bases

Should the tank sump require mounting to a tank's containment collar, the fiberglass tank sump base must be used. The tank manufacturer must provide a 42" diameter fiberglass containment collar which has the specifications illustrated below. Follow these fabrication and mounting instructions to comply with the product warranty.

Dimensions:

- Collar Height = 4"
- Collar Outside Diameter = 42"

Assembly Components:

- 1 - Fiberglass Sump Base
- 1 - Fiberglass Resin Kit

6.2.1 Surface Preparation

Sand the inside surface of the vertical mounting flange at the

bottom end of the fiberglass sump base thoroughly with a medium grit sand paper. Next, sand the outside surface of the tank's fiberglass containment collar. Make sure that all contact areas on both surfaces have been completely sanded and wiped clean with a clean cloth. This procedure removes any surface oxidation, grease or grime creating a suitable bonding surface for the resin kit.

6.2.2 Base Mounting

Place the fiberglass sump base over the top end of the containment collar. Use a level to make sure the sump is straight and level.

6.2.3 Mixing Adhesive

IMPORTANT: Read these instructions completely before mixing chemicals. The resin solution and catalyst are highly flammable. It is important to use the FRK-2000/RK-5000 outside or in a well-ventilated area. Fumes are flammable and may build up in poorly ventilated areas.

WARNING: Catalyst contains METHYL ETHYL KETONE PEROXIDE (MEKP). Avoid direct contact with skin. If skin contact occurs, wash immediately with soap and water. Should eye contact occur, flush immediately with water and contact a physician.

WARNING: Resin solution is highly flammable. Avoid skin contact. Avoid inhalation of fumes. This material contains STYRENE which is listed by the IARC on Cancer as a group 2B cancer causing agent (possibly carcinogenic to humans).

Kit Includes:

- 2 Quart can of putty
- 1 Gallon can of fiberglass resin
- 4 oz. bottle of red catalyst
- 330" of fiberglass matting material
- 1 wooden stir stick
- 1 pair of latex gloves
- 1 3" roller with handle
- 1 screw package (30) screws

STORAGE: The contents of the FRK-2000/RK-5000 are highly flammable. Do not store near flames, sparks, or pilot lights. No Smoking. The shelf life of the FRK-2000/RK-5000 is related to temperature. Do not store resins above 90° F. A maximum shelf life of 6 months can be expected when stored at or below 75° F. Storage in temperatures below 70° F is recommended. Discard any out dated resin in accordance with RCRA Hazardous Waste Methods.

PREPARATION: Prior to mixing the catalyst with the resin solution, the mating surfaces to be bonded must be properly prepared. Be sure all cut edges are smooth and

even. Grind or sand both surfaces to be bonded a minimum of 4" on each surface. Be sure surfaces are free from any oils or debris. Fill in any excessive gaps with putty material. This will reduce the coverage area of the matting material as well as seal the joint and prevent the resin from seeping through.

WARNING: Inadequate joint strength may result if the adhesive is cured at temperatures less than 70°F.

Shelf Life: The resin adhesive has a shelf life of 6 months at 77°F. If the date on the can has passed, do not use the resin. Be sure to properly dispose of the container.

Cold Weather Installation Tips: Ideal bonding conditions for this two-part adhesive is between 70°F and 100°F with normal humidity conditions. Below 70°F the following procedures are to be implemented:

1. Place adhesive kits in a warm room for 6 to 12 hours prior to fabrication so they will be 70°F to 80°F for fabrication.
2. Wrap a roll of fiberglass building insulation around the outside of the containment collar/ sump base joint. Cover the sump base for a period of time to allow the sunlight to warm up the outside of the sump base. Other sources of heat such as a heat lamp may be introduced to the outside of the sump for warming of the collar/sump base joint.
3. Wrap an electric heating blanket around the outside of the containment collar/sump base joint.

Conditions of Extreme Humidity: The sanded surfaces of the containment collar and fiberglass sump base must be free from moisture and other contaminant's in order for the adhesive to produce an effective bond. The presence of moisture or other contaminants will prevent proper adhesion.

Adhesive Pot Life: After Part "A" has been mixed with Part "B", the usable application time of the adhesive is called the "Pot Life". The Pot Life for the mixed adhesive is as follows:

6.2.4 Application

On a smooth disposable surface (e.g. cardboard), lay out sections of fiberglass matting at least two plies thick. Be sure to limit the lengths of the matting strips, as the temperature will dictate the amount of time you will have to work before the fiberglass resin sets up.

CAUTION: Before handling resin and catalyst, be sure to have the following:

- Gloves
- Chemical splash goggles.
- Well ventilated area.

Mix putty and resin as per the proper hardener ratio:
2 oz. of hardener for 1 gallon of resin.
1 oz. of hardener for 2 quarts of putty.

Note: This will vary with temperatures and direct sunlight. If used in temperatures above 80° F reduce hardener to allow proper working time. Immediately stir the mixture thoroughly and pour it onto the matting material. Once the matting is evenly wetted down, place it over the joint. Then, using the fiberglass roller, roll out the matting smoothly getting out any air bubbles and pockets, feathering out the edges into the part.

Repeat this process until the entire joint is glassed in. Once the joint has cured completely, hydrostatically test the sump to ensure liquid tightness.

6.3 Tank Manway Adapters

Should the tank sump require mounting to a tank's outward flanged manway, the tank manway adapter must be used. Both 22" and 24" diameter versions are available to mount a tank sump to a tank's manway. Refer to the manway specifications for specific dimensions. Follow these fabrication and mounting instructions to comply with the warranty.

Assembly Components:

- 8 - Segmented Compression Rings
- 1 - Adapter Ring
- 1 - Flat Rubber Ring Gasket
- 24 - 3/8" Bolts
- 48 - 3/8" Washers
- 24 - 3/8" Nuts
- 1 - Cork Gasket

6.3.1 Sump Base Layout

Turn the sump base over so that the bottom is facing up. Assemble the segmented compression ring on the sump base. Center the assembled ring on the sump base using the fabrication guides. Using a permanent ink marker, trace the inside circle of the segmented ring. Remove the segmented ring from the sump base.

6.3.2 Cutting Out Opening

After the tracing of the inside circle of the segmented compression ring has been completed, cut out the opening as follows: using an electric saber saw fitted with a cutting blade suitable for cutting plastic, cut out the traced circle on the bottom of the sump base. After cutting out the opening, clean the edges using a razor knife or deburring tool.

6.3.4 Outside Bolt Circle Drilling

Reassemble the segmented compression ring on the sump base evenly. Center the ring on the



inside of the cut-out opening. Using two vice grips, clamp the ring to the sump base. Using an electric drill fitted with a 7/16" bit drill out the 24 bolt holes, remove the segmented ring from the sump base.

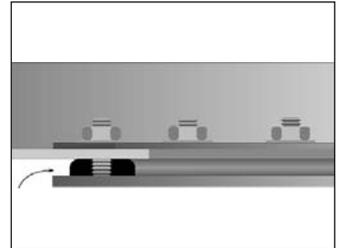
6.3.5 Installing Adapter Ring

After the opening has been cut out and all the bolt holes drilled in the sump base, the adapter ring can be installed. Turn the adapter ring over so that the studs are facing down. Insert the studs into the bolt holes evenly. Push the adapter down flush with the surface of the sump base.



6.3.6 Adapter/Sump Base Assembly

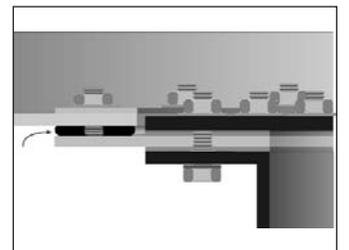
Turn the sump base on its side to provide access to the inside and outside of the bottom. On the inside of the sump base, install the segmented compression ring over the penetrating studs. Next, install the washers and nuts to the studs and gradually begin all nut fasteners in stages until all are firmly secure.



WARNING: Be sure the sump base and gasket are free from debris. Gasket must be located as shown in the illustration.

6.3.7 Manway/Sump Base Assembly

Install the cork gasket over the studs/bolts of the manway flange. Position the sump base over the gasketed flange so that the manway studs/bolts fit through the adapter ring. Place the flat gasket, provided with the kit, over the adapter ring. Install the manway cover over the gasketed adapter ring and install the manway cover nuts.



NOTE: For manways which use bolts, secure them on top with the provided "Tinnerman Nuts". All bolt heads must be sealed from underneath the flange (seal not provided by OPW-FCS). Use SL-1100 or an approved Bostik marine grade sealant.

6.4 Tank Fitting Adapters

Should the tank sump require mounting to a tank's 4" bung fitting, tank fitting adapters must be used. The tank

fitting adapter will install into a 4" or 6" NPT threaded tank fitting. Follow these mounting instructions to comply with the product warranty. The adapter is of sufficient height to prevent interference of the sump base with the ribs of fiberglass tanks. The adapter's connection to the sump and to the tank is liquid tight and secure.

Assembly Components:

1 - Adapter Base	1 - Threaded Ring
1 - Flat Rubber Ring Gasket	8 - 3/8" bolts
1 - Compression Ring	

IMPORTANT: Install two tank fitting adapters for high ground water applications.

6.4.1 Sump Base Fabrication

After the placement of the tank fitting adapter holes have been located on the base of the sump, use a drill fitted with a 5-1/2" hole saw to cut out holes for the 4" tank fitting adapter. Use a saber saw to make the hole for a 6" SMF.

NOTE: Other brands of tank fitting adapters may require different sized hole saws. Always use the correct size hole saw.

6.4.2 Installing Tank Fitting Adapters

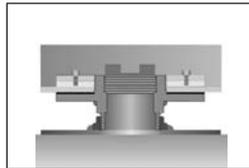
Use a large wrench around the outside of the fitting, or a steel bar positioned in the lugs of the top of the fitting. Tighten the adapter, being careful not to damage the outside threads.

6.4.3 Riser Pipe Adjustments

It may be necessary to modify the height of the riser pipe. The riser pipe needs to be ordered 2" shorter than typically specified or cut and threaded in the field to allow for the height of the tank fitting adapter.

6.4.4 Mounting Sump Base

Remove the compression ring and washer from the adapter. Make sure the flat gasket is evenly positioned on the flange. Second, set the sump base over the threaded riser onto the rubber gasket. Make



sure the sump base fits evenly on the gasket and that there are no obstructions under the base. Third, re-install washer and compression ring and tighten firmly. Make use of the two tabs of the 4" compression ring to tighten into place. When using the TFA-4090, tighten each of the eight bolts in a star pattern.

IMPORTANT: The gasket of the tank fitting adapter's flange must be located under the tank sump base. The sump base and gasket must be free from debris prior to mounting. Make sure that backfill material is evenly distributed and compacted under the sump.

7.0 BASE/RISER CONNECTIONS

For both deep and extended burial tank sumps which have separate base and riser sections, it is necessary to follow the assembly instructions for proper installation of each combination of joint.

7.1 Fiberglass Riser

Prior to installing a fiberglass riser to a fiberglass base, it is necessary to rough sand the entire outside diameter of the riser (the portion which will sit inside the collar of the base) as well as the entire inside diameter of the base collar, with a heavy grit sandpaper. This removes any oxidation, grease or grime, creating suitable bonding surface for the resin kit. Once this has been completed, carefully insert the riser into the base collar making sure it is evenly positioned.

7.1.1 Preparing the adhesive

Refer to the fiberglass adhesive mixing instructions in section 6.2.3 for proper preparation of the adhesive.

7.1.2 Applying the adhesive

Refer to section 6.2.4

8.0 RISER FABRICATION

The riser sections of polyethylene tank sumps have structural ribs which are two inches on center.

8.1 Polyethylene Riser Fabrication

Using a saber saw, the riser can be cut to the desired height by cutting in the valley of two ribs. All cuts should be even, and if necessary, all edges cleaned with a razor knife or a plastic de-burring tool. Make sure there is enough riser left to extend into the skirt of the street manhole so that the bottom of the street manhole skirt does not interfere with the top sump base. This will prevent backfill and/or debris from entering the sump underneath the sump lid.

IMPORTANT: Leave a minimum of 3" of sump riser to allow for proper clearance of the sump cover.

8.2 Fiberglass Riser Fabrication

Measure down from the top of the riser to the desired height and place a mark on the riser. Using a flexible tape, draw a line connecting the marks. With a saber saw, cut along the perimeter of the riser. Be sure to de-burr all the edges after cutting.

IMPORTANT: Leave a minimum of 3" of sump riser to allow for proper clearance of the sump cover.

9.0 RISER/COVER SEAL

After the riser has been cut to the appropriate burial height, the cover seal should be installed to the top of the riser. A tube of adhesive is provided to bond the cover seal to the top of the riser. Apply the adhesive entirely around the seal

area of the riser, both inside and out. Then smooth out the adhesive so that it evenly covers the entire area. Allow to set for ten minutes. Next, install the cover seal over the riser edge and position it evenly into the riser edge. Once installed, inspect around the entire diameter for evenness.



10.0 PIPE ENTRY LOCATIONS

For standard pipe burial applications, the piping should enter at the lowest possible entry point in the sump. For determining the correct pipe entry location for tank sumps, refer to the FlexWorks piping manual. Refer to the flexible entry boot manual for the proper installation of all pipe entries.



11.0 TANK SUMP BACKFILL MATERIALS

IMPORTANT: Prior to backfilling around the tank sump, make sure the sump cover has been installed to prevent any deformation of the riser during backfilling.

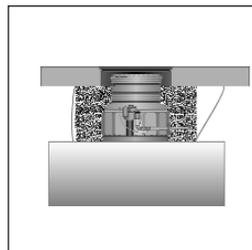
Approved backfill materials for tank sumps shall meet the following specifications:

11.1 Pea Gravel

Rounded pea gravel is permitted with a minimum diameter of 1/8" and a maximum diameter of 3/4".

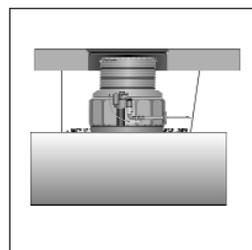
11.2 Crushed Stone

Crushed stone is permitted providing it is washed, cleaned and is the free-flowing type with an angular stone size between 1/8" and 1/2". (Meets ASTM C-33 paragraph 9.1 requirements.)



11.3 Sand

All sand backfill material should be washed clean and free flowing. When backfilling, make sure sand is evenly distributed and packed around the tank sumps.



IMPORTANT: All backfill material should be dry and free from ice, snow and debris. Using material other than those described

above without written approval from OPW-FCS Products, Inc. will void the product warranty.

12.0 POST INSTALLATION TESTING AND INSPECTION

12.1 Visual Inspection

Upon completion of installation, tank sumps must be visually inspected to verify proper installation techniques were followed. All compression ring segments must be in place, gaskets installed, fasteners tightened, flexible entry boots installed properly, joints sealed and covers in place.

12.2 Hydrostatic Testing

In addition to inspection of tank sumps, each unit should be hydrostatically tested. To properly test a tank sump, the following steps should be followed.

12.2.1 Testing Procedure

- Step 1:** Fully assemble tank sump, including all joints and sump penetrations.
- Step 2:** Be sure fill material does not obstruct view of underside of sump.
- Step 3:** Gradually introduce water into the tank sump.
- Step 4:** Fill the sump to 4" above the highest joint or boot. Level should be no less than 24".
- Step 5:** Inspect the outside and underside of the tank sump. Note any leakage of water.
- Step 6:** If no leakage is observed after 1 hour, drain or pump out the tank sump.
- Step 7:** If joints or penetrations show leakage, drain or pump out the tank sump. Inspect and tighten joints or penetrations that showed leakage. Re-conduct test.

13.0 FLEXWORKS SYSTEM MAINTENANCE

The FlexWorks System is designed to provide reliable underground fuel transfer and short-term secondary containment of leaked petroleum product. FlexWorks sumps and secondary containment pipes are not intended for long term storage of petroleum products. Liquid that accumulates in the secondary containment system must be promptly removed and properly disposed of. Operational third party approved liquid sensors should be installed and maintained in each sump to reliably indicate to the operator that liquid is present in the secondary containment system. Once a leak is detected, the system must be shut down immediately and the source of the leak must be repaired. All liquid must be thoroughly flushed and cleaned out of the secondary containment system at once. Inspect all system components at least monthly for leaks or damage, and repair or replace any suspect component as necessary.

13.1 ROUTINE SUMP INSPECTIONS

Visual inspections of all containment sumps and components should be made on a routine basis to check for damage, water infiltration or for any signs of leaking product. An electronic or mechanical shut-off leak detection system is recommended for all

containment sumps. When changing fuel filters at the dispenser, make sure any spilled product is cleaned out of the bottom of the dispenser sump. Sumps are to be kept free of debris and spilled fuel. Sumps are to be kept free of debris and spilled fuel.

NOTE: Failure to remove fuel and liquids from containment sumps may compromise the performance and integrity of the sump and its associated fittings and seals over prolonged periods of time.

14.0 GUIDE SPECIFICATIONS

The following specifications are provided as general guidelines to specify tank sumps.

14.1 Short Form

The contractor shall provide a surface access tank sump as manufactured by OPW-FCS products, Inc. which is to be installed under the street manhole to permit access to an underground storage tank's pump and plumbing components. Access sumps shall be installed in accordance with the manufacturer's current installation instructions.

14.2 Long Form

14.2.1 Design

Tank sumps shall be of such a design that it is capable of moving up or down within the skirt of the street manhole to prevent stresses to the tank and sump in the event of tank or ground movement.

14.2.2 Product Compatibility

All components and accessories of the tank sump shall be chemically compatible with the products to be distributed and with chemicals found naturally in the ground environment.

14.2.3 Corrosion Resistance

All tank sump components which come in contact with the ground environment shall be made of non-metallic material or protected by materials which prevent corrosion.

14.2.4 Structural Integrity

All components shall be designed and constructed of materials strong enough for its intended use. Tank sumps shall not collapse, crack or break due to ground or tank movement, or from backfill and high ground water pressures.

14.2.5 Pipe & Conduit Entries

All tank sumps shall be fitted with pipe and conduit entry seals which are semi-absorbent to ground movement and sufficiently flexible enough to permit angled entries up to 15

degrees without leaking under liquid head pressures of up to six feet (1.8 m).

14.2.6 Liquid Tightness

All tank sumps shall prevent outside surface and ground water from coming into the container and prevent any leaking product originating from within the sump from escaping into the underground environment. OPW-FCS recommends hydrostatic testing on all sumps after installation to check for proper sealing of joints and connections.

14.2.7 Height Adjustability

All tank sumps shall be field height adjustable to accommodate different tank burial depths.

14.2.8 Tank Mounting

Tank sumps should be secured to the underground storage tank by means of factory approved and warranted adapters and methods.

14.2.9 UL® Testing

Tank sumps shall be tested and listed by Underwriters Laboratories to meet "Standard Testing Procedure for Underground Dispenser Sumps and Tank Sumps".

LIMITED WARRANTY

NOTICE: FlexWorks by OPW, Inc., VAPORSAVER and all other OPW products must be used in compliance with all applicable federal, state, provincial and local laws, rules and regulations. Product selection must be based on physical specifications and limitations, compatibility with the environment and material to be handled. All illustrations and specifications in this literature are based on the latest production information available at the time of publication. Prices, materials and specifications are subject to change at any time, and models may be discontinued at any time, in either case, without notice or obligation.

OPW warrants solely to its customer that the following products sold by OPW will be free from defects in materials and workmanship under normal use and conditions for the periods indicated:

Product	Warranty Period
FlexWorks Primary Pipe	10 years from date of manufacture
All Products Certified to California 2001 Standards*	1 year from date of manufacture or from date of installation registration (Not to exceed 15 months from date of manufacture)
All other Products	1 year from date of manufacture

* Products certified to California 2001 Standards will have an OPW registration card enclosed/attached to the product.

OPW's exclusive obligation under this limited warranty is, at its option, to repair, replace or issue credit (in an amount not to exceed the list price for any defective product) for future orders for any product that may prove defective within the applicable warranty period (repairs or replacements are subject to prorated warranty coverage for remainder of the original warranty period). Complete and proper warranty claim documentation and proof of purchase required. All warranty claims must be made in writing and delivered during the applicable warranty period to OPW at P.O. Box 405003, Cincinnati, Ohio 45240, Attention: Customer Service Manager. No products may be returned to OPW without its prior written authority.

This limited warranty shall not apply to any FlexWorks or VAPORSAVER product unless it is installed by an OPW attested installer. This limited warranty also shall not apply to any FlexWorks, VAPORSAVER or other OPW product: unless all required site and warranty registration forms are completed and received by OPW within 60 days of installation; unless all piping connections are installed with a nationally-recognized or state-approved leak detection device in each tank and dispenser sump (which are not for storage and from which all discharge hydrocarbons must be removed, and the systems completely cleaned, with 24 hours); unless testable sumps utilize FlexWorks pipe and access fittings; unless a sump inspection log or an EPA recommended/required checklist is maintained and the results are furnished to OPW upon request; and unless OPW is notified with 24 hours of any known or suspected product failure and is provided with unrestricted access to the product and the site. This limited warranty also shall not apply to any product which has been altered in any way, which has been repaired by anyone other than a service representative authorized by OPW, or when failure or defect is due to: improper installation or maintenance (including, without limitation, failure to follow FlexWorks Quick Reference Manual Installation Guide and all product warning labels); abuse or misuse; violation of health or safety requirements; use of another manufacturer's, or otherwise unauthorized, substances or components; soil or other surface or subsurface conditions; or fire, flood, storm, lightning, earthquake, accident or any other conditions, events or circumstances beyond OPW's control.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND ALL OTHER WARRANTIES INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXCLUDED. OPW shall have no other liability whatsoever, whether based on breach of contract, negligence, gross negligence, strict liability or any other claim, including, without limitation, for special, incidental, consequential or exemplary damages or for the cost of labor, freight, excavation, clean-up, downtime, removal, reinstallation, loss of profit, or any other cost or charges. No person or entity is authorized to assume on behalf of OPW any liability beyond this limited warranty. This limited warranty is not assignable.



OPW Fueling Containment Systems

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Notice: OPW-FCS products must be used in compliance with applicable federal, state, provincial and local laws and regulations. Product selection should be based on physical specifications and limitations and compatibility with the environment and material to be handled. OPW-FCS makes no warranty of fitness for a particular use. All illustrations and specifications in this literature are based on the latest production information available at the time of publication. Prices, materials and specifications are subject to change at any time, and models may be discontinued at any time, in either case, without notice or obligation. For complete OPW-FCS warranty information, visit our web site at www.opwglobal.com.