



**Installation Instructions  
Fiberglass Tank Sumps  
FTS / FCS / TSE Series**

# IMPORTANT INFORMATION – FOLLOW ALL INSTRUCTIONS

Please read these warnings and use and assembly instructions completely and carefully before starting. Failure to do so may cause product failure, or result in environmental contamination due to liquid leakage into the soil, creating hazardous spill conditions.

**OPW Standard Product Warranty Tag:** 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 is the sole responsibility of the customer and/or its agents and 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 (the initial purchaser and any subsequent purchasers within the warranty period) 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 and replacement parts installed in the State of California Certified to California CP-201 and/or CP-206 Standards*	1 year from date of installation (proof of purchase from certified contractors/ technicians required) OPW warrants ongoing compliance with the standards and specifications for the duration of the warranty period required by the State of California; this limited warranty is under the condition the equipment was installed and maintained by trained and certified contractors/ technicians unless noted in Installation Manual.
All other Products and replacement parts	1 year from date of manufacture**
*Products certified to California CP-201 and/or CP-206 Standards have been factory tested and met all applicable performance standards and specifications and 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 the product) for future orders for any product that may prove defective within the applicable warranty period. (Parts repaired or replaced under warranty 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 OPW 9393 Princeton-Glendale Road Hamilton, Ohio, USA 45011, 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 and all required site and warranty registration forms are completed and received by OPW within 60 days of installation. This limited warranty also shall not apply to any FlexWorks, VAPORSAVER™ or other OPW product: 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, within 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 within 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 un-authorized, 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.

#### **IMPORTANT**

Read these assembly and installation instructions completely and carefully prior to starting. Check to make sure all parts have been provided. Use only the parts supplied; substitution of parts may cause product failure.

**IMPORTANT: Please read all warnings and follow the installation instructions completely and carefully. Failure to do so will void all warranties and may cause product failure, or result in environmental contamination due to liquid leakage into the soil, creating hazardous spill conditions.**

**WARNING - DANGER: Using electrically operated equipment near gasoline or gasoline vapors may result in fire or explosion, causing personal injury and property damage. Be sure that the working area is free from such hazards, and always use proper precautions.**

#### **Tank Sumps**

OPW Fibrelite FlexWorks FibreTite / ElectroTite Primary Tank Sumps for automotive fuels are installed below grade on top of UST's to provide secondary containment of and access to underground equipment such as submersible pumps, tank bung fittings, and various piping connections. Tank Sumps extend from the top of the tank to just below a manhole cover at grade level. The sump cover must be located within the grade level manhole skirt just under the manhole cover. If the tank is too deep to allow for this, a deeper sump must be used. FTS / FCS series fiberglass tank sumps are available with three different base options (collar ring, solid bottom, and reverse flange), one cover with handles option, in 42", 48", and 54" diameters. TSE series tank sumps are only available in 42" diameter with the same base options and two cover options. TSE cover options include compression fit cover and -WT handle style covers.

#### **Maximum Sump Burial Depths**

FTS & FCS series w/extensions: 84" (7 ft)  
FCSM / FTSM Max 56" (4.7 ft) without extensions  
FCSD / FTSD Max 64" (5.3 ft) without extensions  
FTSM-5437XX Max 60" (5 ft), extensions are not available.

TSE series Max 56" (4.7 ft).

**Extensions should not be used with TSE series.**

#### **NOTE:**

Do not store sumps on their sides prior to installation. Failure to do so may cause sump to deform preventing installation on the round tank collar.

#### **IMPORTANT:**

For best results, Flexworks / Fibrelite Fiberglass Tank Sumps should be installed when the ambient temperature is at least 50°F to allow proper curing of the epoxy resin adhesive. (See RK-5000 Resin Kit Instruction Sheet).

**NOTE:** Sump must be assembled and installed by a qualified person. The use of non-qualified personnel or any deviations from these recommended procedures could result in damage or leakage.

#### **NOTE:**

Sumps have been evaluated per UL for use with REF, HEF, SMF, TFA, TMA, and AXP series of products. Failure to use recommended combinations of sump products in a completed assembly may cause damage or leakage.

Sumps have also been evaluated per ULC for use with REF, CEJ, DEB, and EBF series of products.

#### **NOTE:**

Sump products are not intended for storage in excessive temperatures or direct sunlight. Rough handling may cause damage and leaking in use. Visually inspect sump prior to installation to ensure no damage. Damaged sumps shall not be used.

**TOOLS NEEDED FOR INSTALLATION AND ASSEMBLY:**

1. String line
2. Tape measure
3. Level
4. Permanent marker
5. Cutting tool (saber saw, circular saw, jigsaw, or angle grinder with a diamond grit blade)
6. Heavy grit sandpaper
7. Acetone
8. RK-5000 epoxy kit

Items need for collar ring models only:

9. Duct tape

Items needed for FCS series only:

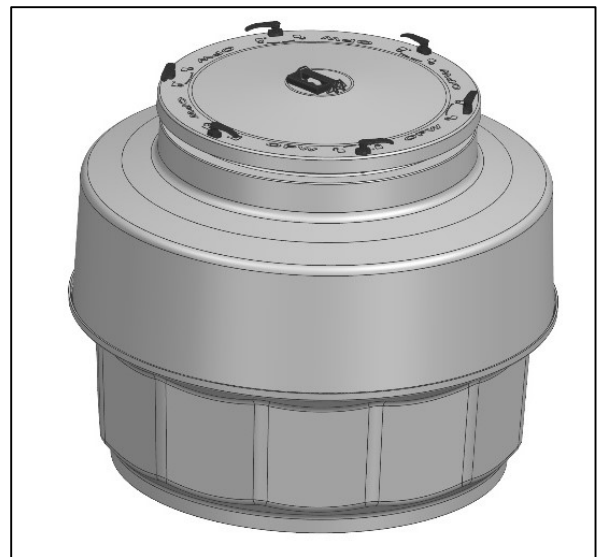
10. Torque wrench (in-lb)
11. Ratchet and sockets including: 7/16" socket and 1/2" socket
12. Pipe wrench

Items needed for TSE-4233XX series only:

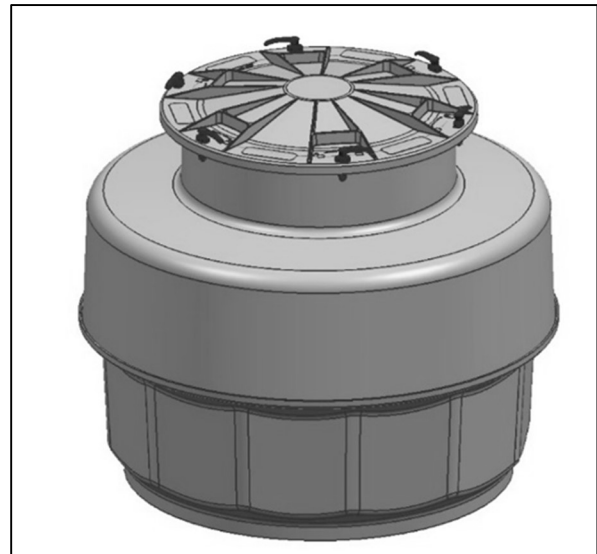
13. Caulk gun
14. SL-1100 sealant

Items needed for L-handle adjustment:

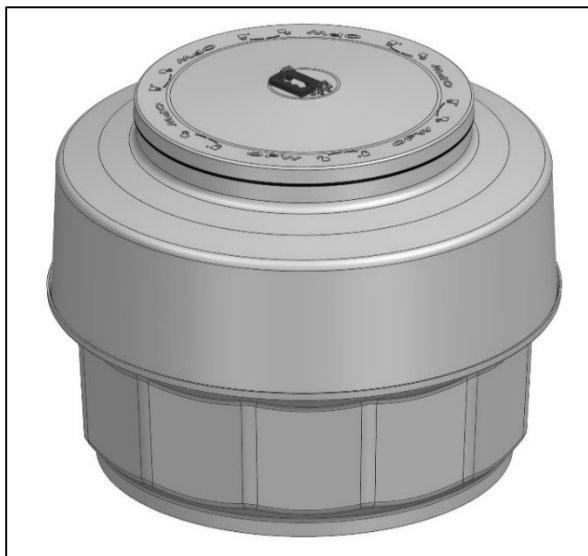
15. 17 mm combination wrench
16. Ratchet / torque wrench with 17 mm socket



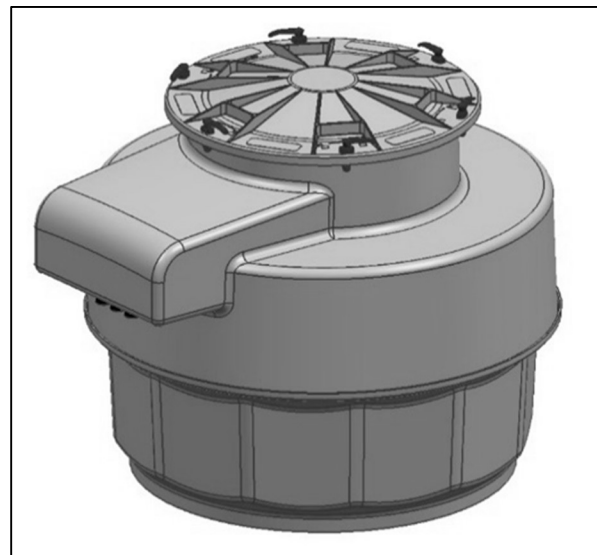
TSE-4233XX-WT Series



FTSX-4X3X Series



TSE-4233XX Series



FCSX-X-4X3X Series

### STEP 1: INSTALL STRING LINE

Install string lines at finished grade level (manhole grade level) as shown in Figure 1 in order to accurately measure the distance from grade level to the tank.

Note: The cover frame / ring will be set 1 inch minimum (for slope) above the final grade position.

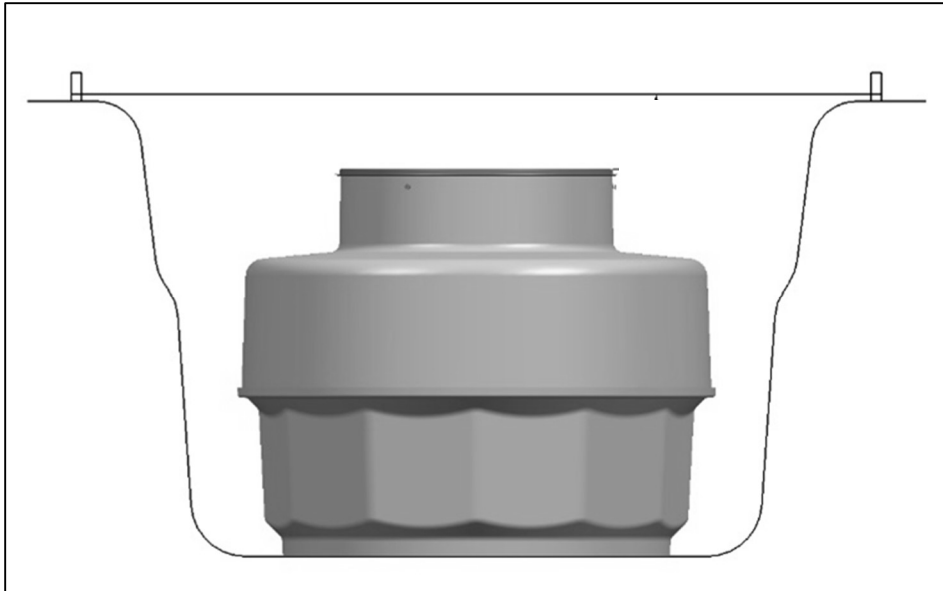


Figure 1

### STEP 2: MEASURE TO TANK

Measure "Dimension A" from string line at finished grade level to tank. **Dimension A** = \_\_\_\_\_ inch

For collar ring models measure to stop on collar as shown in Figure 2 below.

For reverse flange models measure to tank flange.

For solid bottom models measure to top of bung as shown in Figure 2 below.

**Note:** For a sample calculation see Appendix A.

"Dimension A" cannot exceed maximum burial depth for sump (see page 2 for max. sump burial depths).

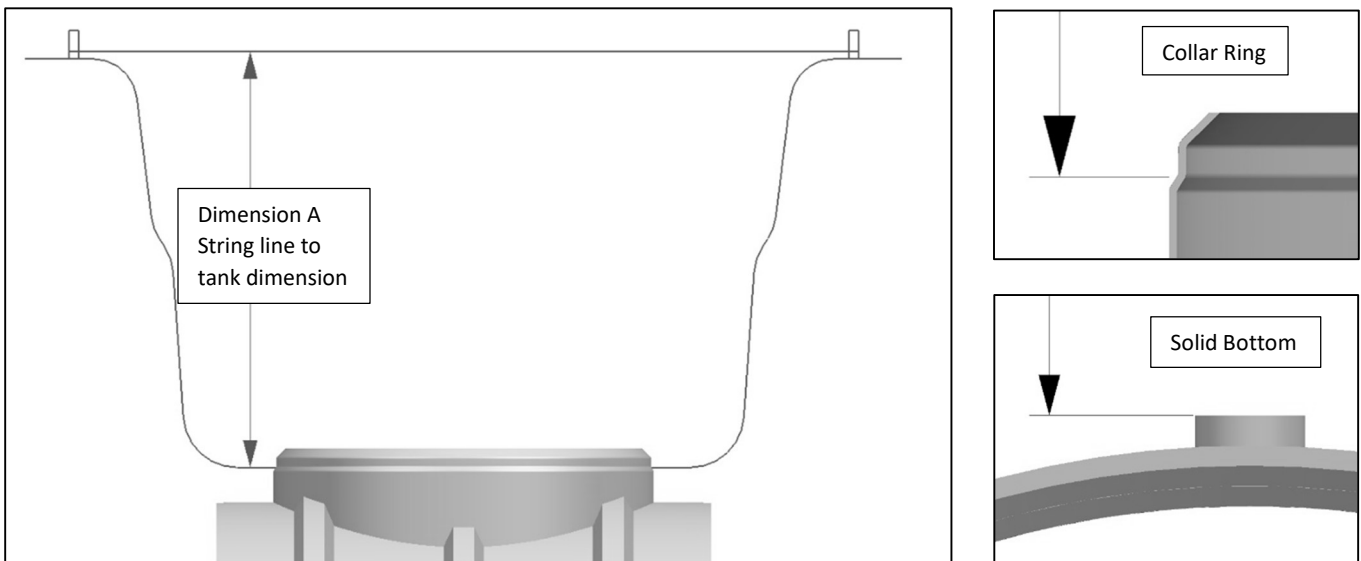


Figure 2

### STEP 3: DETERMINE STRING LINE TO TOP HAT DIMENSION

A minimum 3 inch clearance is required between any load-bearing item and the tank sump. Determine "Dimension B" from finish grade string line to top hat. See Figure 3. This is the minimum distance necessary to ensure 3" minimum clearance between underside of manhole cover / tank sump cover and bottom of skirt / top hat. Common "Dimension B" distances for OPW manholes can be found in the table below as illustrated in Appendices B and C. Table assumes the manhole ring is set 1" above string line for slope. If slope will exceed 1", calculation can be adjusted accordingly.

In general "Dimension B" can be calculated by measuring the manhole thickness (**including ribs on underside**), subtracting 1" for slope from grade, adding 2.5" for tank sump cover height, and adding 3" for clearance between underside of manhole cover / tank sump cover. Skirt clearance can affect this dimension and also needs to be taken into account to ensure adequate clearance.

OPW Manhole Style	Tank Sump Style	Dimension B (inch)	Notes
39CD / 44CD -XX10	FTSM / FTSD / TSE	5.3	
37MAT / 42MAT	FTSM / FTSD / TSE	5.8	
FL90 / FL100 -BSK12	FTSM / FTSD / TSE	8.2	
39CD / 44CD -XX10	FCSM / FCSD	5.5	Requires notch in manhole skirt, see Step 16.
39CD / 44CD -XX10	FCSM / FCSD	8.0	No notch in manhole skirt
37MAT / 42MAT	FCSM / FCSD	5.5	Requires notch in manhole skirt, see Step 16.
37MAT / 42MAT	FCSM / FCSD	10.0	No notch in manhole skirt
FL90 / FL100 -BSK12	FCSM / FCSD	8.2	Requires notch in manhole skirt, see Step 16.
FL90 / FL100 -BSK12	FCSM / FCSD	12.4	No notch in manhole skirt

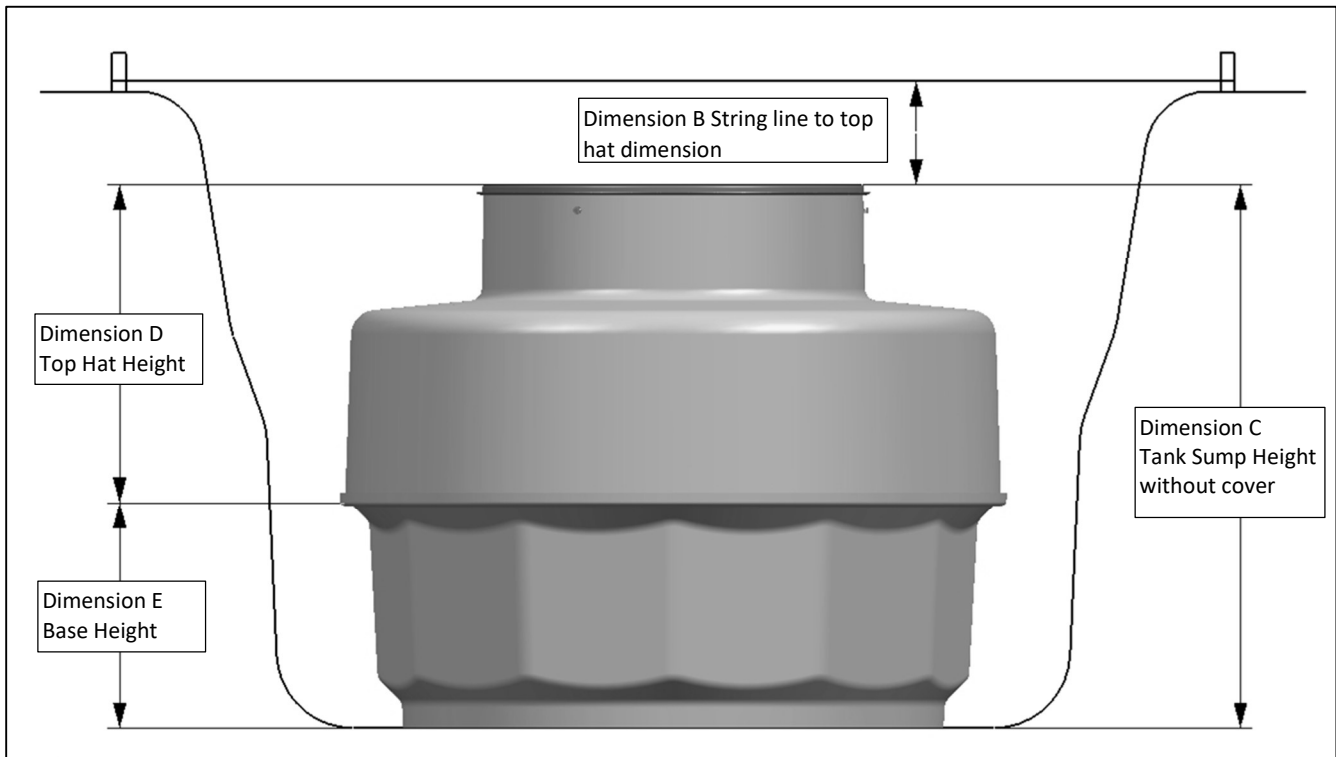


Figure 3

**STEP 4: CALCULATE TANK SUMP HEIGHT WITHOUT COVER**

Calculate “Dimension C”, required tank sump height (without tank sump cover) by subtracting “Dimension B” from “Dimension A”. See Figure 3. The height calculation for solid bottom models needs to account for the height of the sump mounting flange. Use appropriate calculation below to determine tank sump height without cover.

Calculation for Collar Ring and Reverse Flange Models

**Dimension C**, Tank Sump Height without cover =  $\frac{\text{Dimension A}}{\text{Dimension A}} - \frac{\text{Dimension B}}{\text{Dimension B}} = \frac{\text{Dimension C}}{\text{Dimension C}}$  inch

Calculation for Solid Bottom Models Only

**Note:** For solid bottom models the installed height of different mounting flange models can be found in the table below.

Mounting Flange	Installed Height (inches)
TFA-4090	2.0
SMF-4E Series	4.0
SMF-6	3.0

**Dimension C**, Tank Sump Height without cover =  $\frac{\text{Dimension A}}{\text{Dimension A}} - \frac{\text{Dimension B}}{\text{Dimension B}} - \frac{\text{Mounting Flange}}{\text{Mounting Flange}} = \frac{\text{Dimension C}}{\text{Dimension C}}$  inch

**STEP 5: CHECK TANK SUMP HEIGHT WITHOUT COVER**

Confirm calculated “Dimension C”, tank sump height (without cover), matches height range in table below for sump series and does not exceed maximum burial depth. If height does not match a different sump may be required.

Tank Sump Model	Maximum Height (inches), without extensions	Minimum Trimmed Height (inches)
FTSM-4X3X Series	43.5	30
FTSM-5437 Series	49.5	36
FTSD Series	51	37.5
FCSM Series	43.5	35.5
FCSD Series	51	43
TSE-4233XX Series	40	26.5
TSE-4233XX-WT Series	42.8	29.3

**Note:** Minimum height for solid bottom models is 1” taller than listed in the table.

**Note:** FCS4X-EX12 can be used to increase height of FTSM, FTSD, FCSM, and FCSD series that are 42” or 48” in diameter. See Appendix D for sample calculation with extensions along with calculation adjustments needed when using extensions. Extension is available in 12” height. Maximum of 3 extensions per sump can be used up to a maximum burial depth of 84”. See Step 9 Method 2 for extension attachment. Extensions are not available for FTSM-5437 series. Extensions should not be used with TSE series.

**STEP 6: CALCULATE TANK SUMP TOP HAT HEIGHT**

Calculate “Dimension E” tank sump top hat height by subtracting “Dimension D” base height from “Dimension C” tank sump height (without cover). See Figure 3. “Dimension D” base heights can be found in the table below. As received top hats are 25 inch height (except TSE-42XX compression lid models which are 21.5 inch height).

FTSM / FTSD / TSE series top hats can be trimmed a maximum of 12.5”. See Fig. 4.

FCSM / FCSD series top hats can be trimmed a maximum of 7” to an overall height of 18”. See Fig. 5.

Tank Sump Model	Dimension D Base Height (inches)
FXSM-4X3X / TSE, Medium, Collar Ring	17.5
FXSM-4X3X / TSE Medium, Reverse Flange & Solid Bottom	18.5
FTSM-5437 Medium, Collar Ring	23
FTSM-5437 Medium, Reverse Flange & Solid Bottom	24
FXSD, Deep, Collar Ring	25
FXSD, Deep, Reverse Flange & Solid Bottom	26

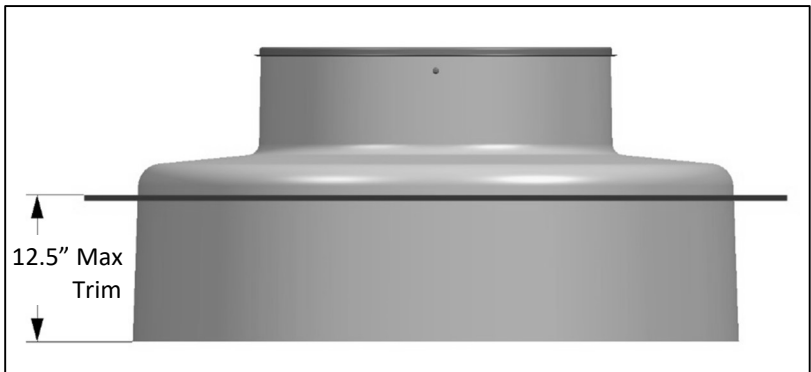
$$\text{Dimension E, Top Hat Height} = \frac{\text{Dimension C}}{\text{Tank Sump Height}} - \frac{\text{Dimension D}}{\text{Base Height}} = \text{_____ inch}$$

Calculate “Dimension F” top hat trim distance for use in Step 9 by subtracting “Dimension E” from 25 inch.

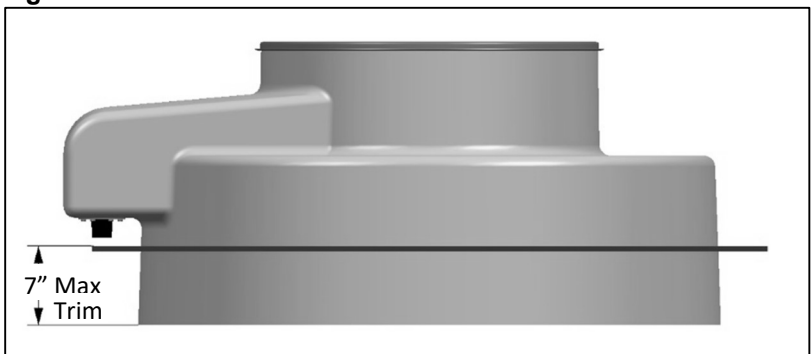
$$\text{Dimension F, Top Hat Trim Distance} = 25 \text{ inch} - \frac{\text{Dimension E, Top Hat Height}}{\text{Dimension E, Top Hat Height}} = \text{_____ inch}$$

For TSE sumps with compression lid use 21.5 inch

**Note:** See Appendix D for calculation adjustments needed when using extensions.



**Figure 4**



**Figure 5**

## STEP 7: MOUNT BASE

Mount the tank sump base to the UST. Flexworks FTS / FCS / TSE series fiberglass tank sumps are available with three different base options (collar ring, solid bottom, and reverse flange). Use the appropriate method to mount the tank sump base.

### Method 1: Solid Bottom, Mounting Flanges (not shown)

Attach the base of the sump to the tank bung fittings using Flexworks Sump Mounting Flanges –

Flexworks product numbers:

SMF-4E	4" NPT Mounting Flange
SMF-4EFT	4" NPT Mounting Flange
SMF-6	6" NPT Mounting Flange
TFA-4090	4" No Bolt Style

\* See Installation Instructions supplied with Flexworks Sump Mounting Flanges. Ensure sump is level as described in Method 3c and Figure 7.

**Note:** As mentioned in mounting flange instructions ensure proper backfill with no voids under tank sump bottom.

### Method 2: Reverse Flange (not shown)

Attach the base of the sump to the tank flange per tank manufacturers instructions. Reverse flange sumps have 24 bolt holes on a 32" bolt circle with a 29.25" ID. Ensure sump is level as described in Method 3c and Figure 7.

### Method 3: Collar Ring

Measure across the tank collar to confirm if it is 42", 48", or 54" diameter and confirm tank sump matches. Attach sump base to collar using a FlexWorks Resin Adhesive Kit (product number RK-5000, sold separately). One RK-5000 kit will be needed for collar attachment (42" or 48" diameter). Tank sumps evaluated per UL / ULC as a complete assembly using RK-5000.

**NOTICE:** Many mounting kits supplied by other manufacturers are not warranted by OPW. OPW bears no responsibility whatsoever for the integrity of joints using alternate tank sump mounting systems.

a) Using heavy grit sandpaper, completely roughen the surface of both the sump collar and the sump base where they will be joined with the resin adhesive kit. All sanded surfaces must be wiped clean with acetone and a clean cloth immediately prior to bonding to ensure that no dust, dirt, grease, or oil are present on the surfaces. The surfaces must be free from moisture and other contaminants.

b) Immediately after cleaning install the tank sump onto the tank collar. Prior to attaching the sump to the collar, dry fit it onto the collar and position so that the sump facets align perpendicular with the pipework exit / entry points. See Figure 6.

**For FCS series ensure that pipe entry points will not interfere with desired Kwik Wire junction box location.**

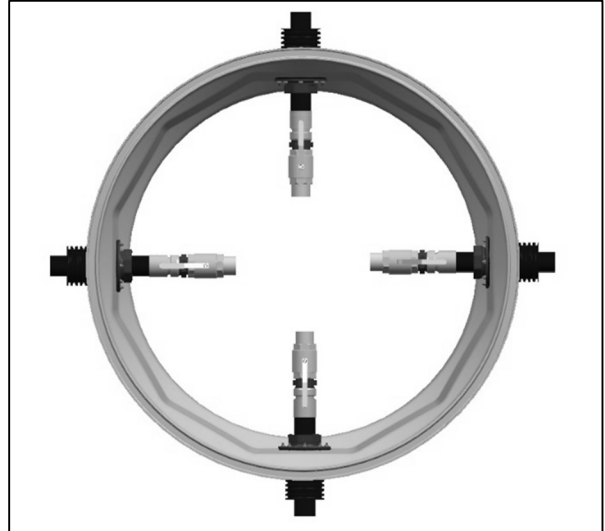


Figure 6

c) Use a level to set the sump base on the collar as shown in Figure 7.

**CAUTION:** The sump base must be set level to ensure that the adhesive will fill the trough evenly around the entire diameter of the middle joint to be assembled in Step 10.

Double check sump height calculations before proceeding.

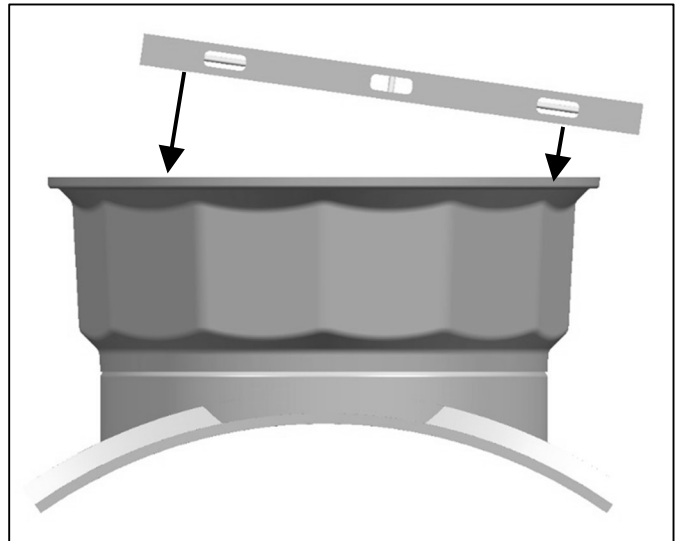


Figure 7



d) After leveling the sump base, apply duct tape around the outside of the joint between the sump base and the collar to prevent the adhesive from running out of the joint before it hardens. See Figure 8.

**Note:** Instead of duct tape the outside of the collar can be glassed on using the S-CR-FGK kit. Detailed tank collar fiberglass instructions are packed in the S-CR-FGK kit. Even when outside of collar is glassed on RK-5000 must be used on inner collar joint.

e) Mix RK-5000 resin adhesive kit following the detailed instructions (p/n ERAI-0001) packed with kit

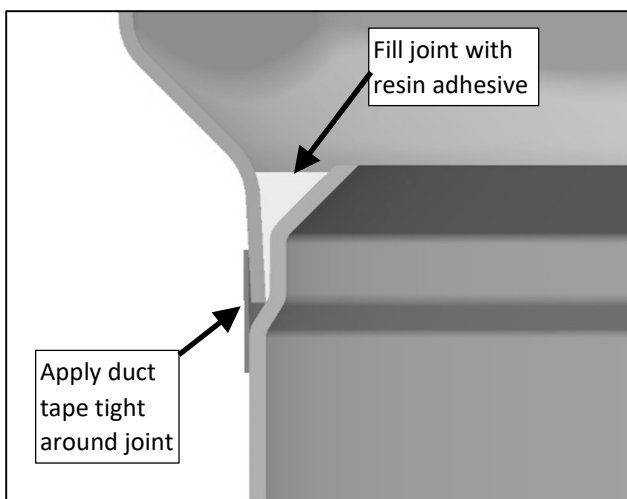
For best results, the adhesive resin kit should be stored and mixed at room temperature. If the temperature is below 60°F, the adhesive must be warmed and mixed indoors. Pour the entire contents of Part A and Part B into mixing container. Thoroughly mix the adhesive with the provided mixing stick or with a drill mounted mixing paddle at low speed for a minimum of three (3) minutes. Be sure to scrape the bottoms and sides of the container to ensure proper and complete mixing.

Pour the entire mixture into the joint between the tank collar and the tank sump. See Figure 8. Allow adhesive to set up undisturbed until it is hard.

#### **Important: Resin Set-up Times**

After joining the sump base to the collar allow the resin adhesive to harden before proceeding. Carefully follow the instructions supplied with the RK-5000 resin adhesive kit and observe minimum set-up times before proceeding.

**DO NOT BACKFILL OR CONTINUE WORK IN OR AROUND THE SUMP UNTIL THE RESIN IS COMPLETELY CURED.**



**Figure 8**

## **STEP 8: INSTALL ENTRY FITTINGS**

Install the appropriate FlexWorks pipe and conduit entry fittings into the flats around the tank sump base at the proper locations (Refer to the appropriate FlexWorks Entry Fitting Installation Instructions).

**Note: Conduit entry fittings should not be needed with FCS series sumps with Kwik Wire junction box. Ensure that pipe entry points will not interfere with desired Kwik Wire junction box location.**

To ease installation, it is recommended to install motor and piping prior to setting the top hat.

### **Determining Pipe Entry Height**

Pipe entries are generally located as close to the bottom of the tank sump as possible. The lower the pipe entry into the tank sump wall, the easier it will be to maintain the proper piping slope back to the UST from the dispensers.

**NOTE:** If sump extensions are used entry fittings should not be installed in the extension.

## **STEP 9: HEIGHT ADJUSTMENT**

If necessary, the height of FlexWorks tank sumps can be adjusted in the field. A portion of the sump top hat can be cut off to shorten the sump height or FCS4X-EX12 extensions can be used to increase the height of some tank sumps (FTSM, FTSD, FCSM, and FCSD series that are 42" or 48" in diameter). To shorten the tank sump use Method 1 below. To extend the tank sump use Method 2 below. If "Dimension F" calculated in Step 6 is zero proceed to Step 10.

### **Method 1: Shorten Tank Sump Top Hat**

Using "Dimension F" calculated in Step 6 mark the top hat trim distance on the top hat. Do not exceed maximum trim distances as shown in Figures 4 & 5. Double check sump height calculations before cutting top hat. Using a saber saw, circular saw, jigsaw, or angle grinder with a diamond grit blade cutoff the necessary portion of the top section **making sure the cut is square**. Before proceeding, test fit the top hat by placing it in the trough on the sump base. Verify that the correct sump height, "Dimension C", has been attained and the cut has been made square. See Figures 9 & 10.

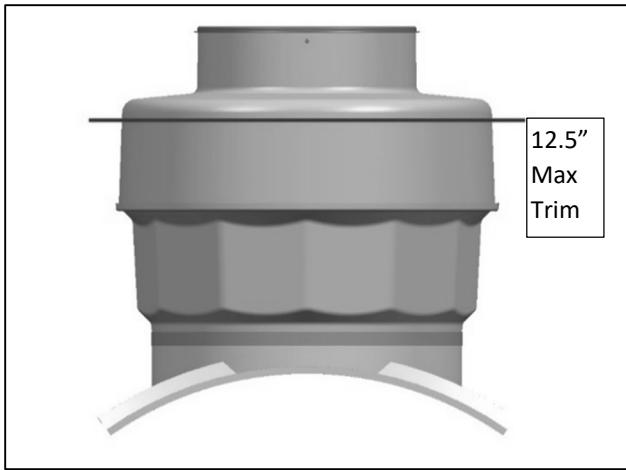


Figure 9

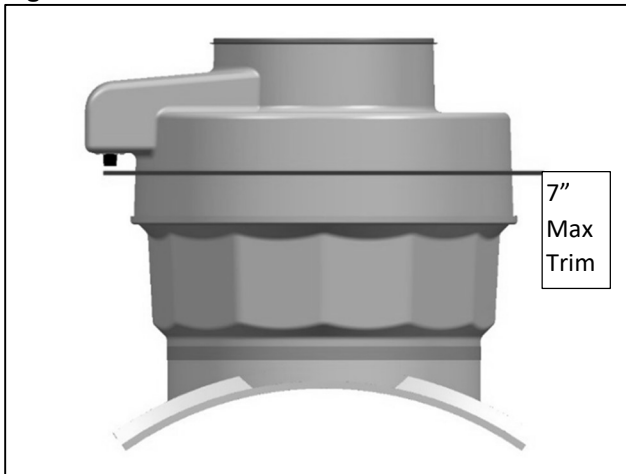


Figure 10

### Method 2: Extend Tank Sump Top Hat

Using the FCS4X-EX12 extension can extend the top hat in 12" increments for FTSM, FTSD, FCSM, and FCSD series tank sumps that are 42" or 48" in diameter. Maximum of 3 extensions per sump can be used up to a maximum burial depth of 84". Using "Dimension E" and "Dimension F" calculated in Appendix D for extensions mark the top hat trim distance on the top hat. Do not exceed maximum trim distances as shown in Figures 4 & 5. Double check sump height calculations before cutting top hat. Using a saber saw, circular saw, jigsaw, or angle grinder with a diamond grit blade cutoff the necessary portion of the top section **making sure the cut is square**. Before proceeding, test fit the extension(s) and top hat by placing it in the trough on the sump base. Extension(s) is placed between sump base and top hat. Verify that the correct sump height, "Dimension C", has been attained and the cut has been made square. See Figure 11.

**NOTE:** Extensions are not available for FTSM-5437XX sumps. **Extensions should not be used with TSE series.**

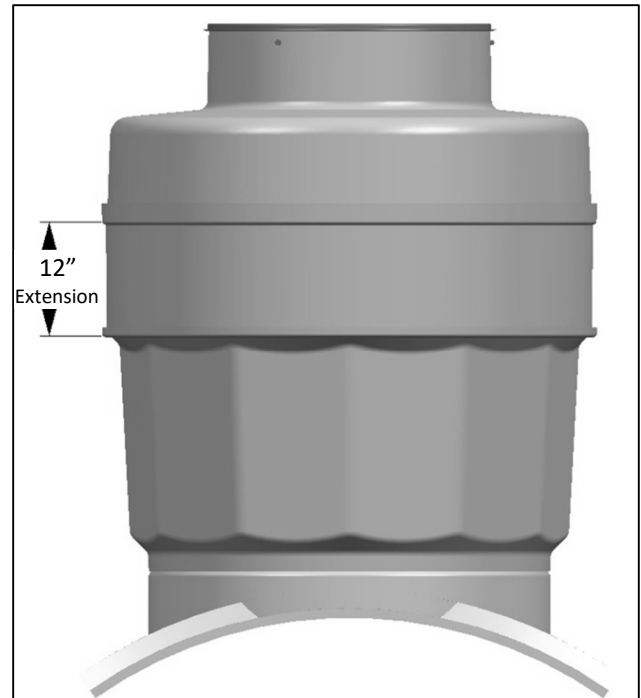


Figure 11

### STEP 10: MIDDLE JOINT

After test fitting the top hat remove it from the sump.

**For FCS series sumps with Kwik Wire junction box from this point forward it is imperative that the electrical contractor be present or consulted to ensure conduit placement is coordinated. The Kwik Wire junction box receives all conduit for each tank sump in a single location, located in the top hat. It is of the utmost importance that prior to installing the top hat the Kwik Wire junction box be positioned in a location where all conduit has been / will be laid. It is recommended to dry fit the top hat and ensure conduit can reach its intended location prior to pouring resin. See Figure 12.**

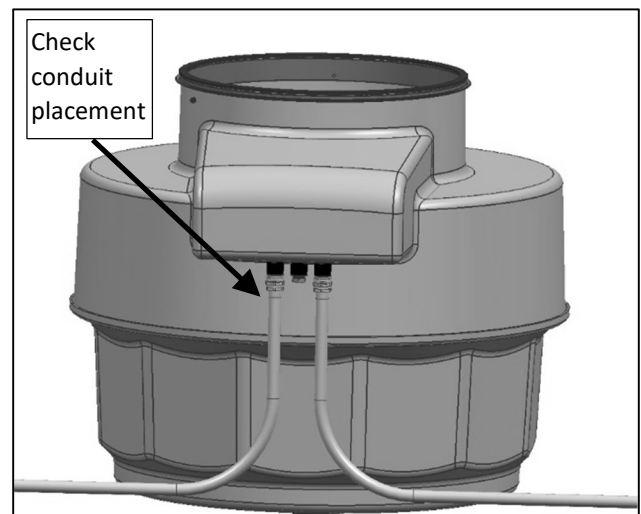


Figure 12 – FCS Series Only

Prepare top hat (or extension) for attachment to sump base.

**Note:** When using an FCS4X-EX12 extension the extension will be attached to the sump base.

Using heavy grit sandpaper, completely roughen the surface of both the sump base and top hat (or extension) where they will be joined with the resin adhesive kit. All sanded surfaces must be wiped clean with acetone and a clean cloth immediately prior to bonding to ensure that no dust, dirt, grease, or oil are present on the surfaces. The surfaces must be free from moisture and other contaminants.

Immediately after cleaning install the top hat (or extension) onto the tank sump base.

**As previously mentioned, for FCS series ensure that final Kwik Wire junction box location aligns with conduit location.**

RK-5000 resin adhesive kit (sold separately) required for this joint. For 42" diameter models one RK-5000 kit needed for this joint. For 48" & 54" dia. models 1.5 RK-5000 kits are needed for this joint.

Mix RK-5000 resin adhesive kit following the detailed instructions (p/n ERAI-0001) packed with kit

For best results, the adhesive resin kit should be stored and mixed at room temperature. If the temperature is below 60°F, the adhesive must be warmed and mixed indoors. Pour the entire contents of Part A and Part B into mixing container. Thoroughly mix the adhesive with the provided mixing stick or with a drill mounted mixing paddle at low speed for a minimum of three (3) minutes. Be sure to scrape the bottoms and sides of the container to ensure proper and complete mixing.

Pour the entire mixture into the trough on the sump base. See Figure 13. Allow adhesive to set up undisturbed until it is hard.

**Important: Resin Set-up Times**

After joining the top hat (or extension) to the sump base allow the resin adhesive to harden before proceeding. Carefully follow the instructions supplied with the RK-5000 resin adhesive kit and observe minimum set-up times before proceeding.

**Note:** For added protection, a bead of FlexWorks SL-1100 can be applied to joint after epoxy cures.

**DO NOT BACKFILL OR CONTINUE WORK IN OR AROUND THE SUMP UNTIL THE RESIN IS COMPLETELY CURED.**

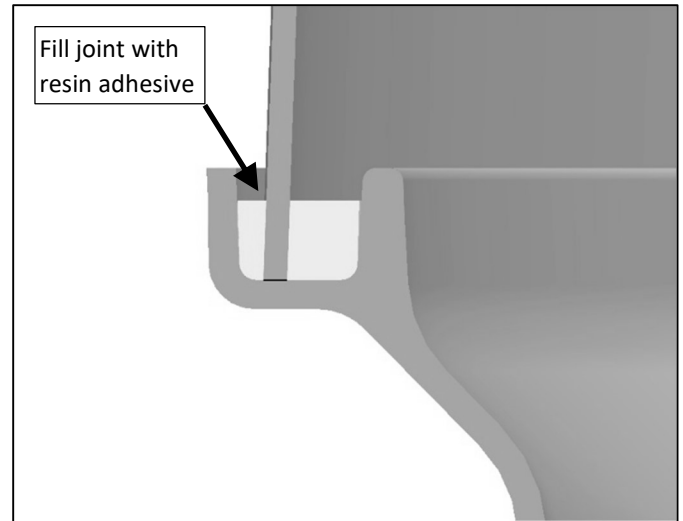


Figure 13

**STEP 11: EXTENSION ATTACHMENT – optional**

This Step only applies to installations requiring an extension. Proceed to Step 12 if extension is not needed.

Sand and clean top hat and extension as done previously in Steps 7 & 10. The bell end of each extension **must** be joined with both an RK-5000 resin adhesive kit and fiberglass. Each extension joint (both 42" and 48" diameter) requires one RK-5000 resin adhesive kit per joint (sold separately). Mix and pour as done previously in Steps 7 & 10. The S-TH-FGK or S-CR-FGK kit (sold separately) can be used to glass the joint. Detailed fiberglass instructions are packed in fiberglassing kit. After sanding and cleaning, mix resin and paint onto sanded surfaces followed by three layers of fiberglass tape and a final coat of resin. See Figure 14. Repeat steps for additional extensions. Allow a minimum of one hour for the resin to cure before proceeding with any other work on the tank sump. Allow 24 hours before putting any stress on sump.

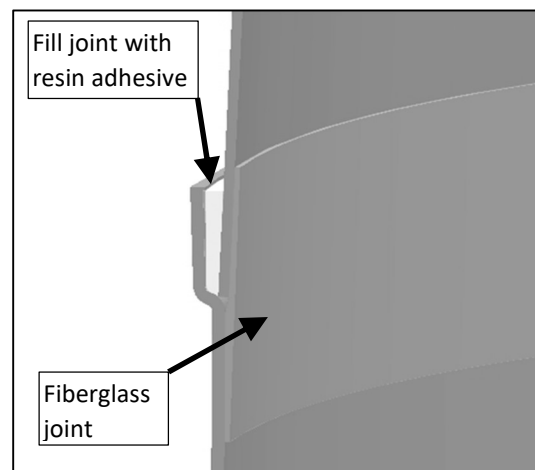


Figure 14

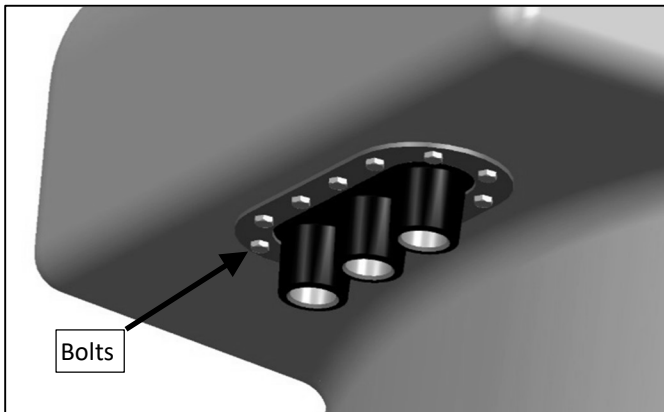
**STEP 12: KWIK WIRE JUNCTION BOX –  
only for FCS Series sumps**

**This Step only applies to FCS series sump installations with Kwik Wire Junction Box. Proceed to Step 13 for FTS & TSE series sumps.**

The CEJ-3210 Kwik Wire junction box is c UL us approved for use in hazardous locations as a conduit, junction, pull, outlet box for Class 1 Group D locations as defined by the National Electric Code. Each box has an internal volume of 42 cubic inches. Each top hat will have a maximum of two factory installed CEJ boxes. Each CEJ box has three external 1" NPT thread connections and two internal 1" NPT thread connections. The segmented design allows both high voltage and low voltage to share the same junction box. The CEJ box must be installed per the National Electric Code (NEC) and any Authority Having Jurisdiction (AHJ) requirements.

**WARNING** – Disconnect equipment from supply circuit before and during installation.

**a)** Verify torque on external mounting bolts (7/16" socket). Torque to be 60 in-lbs. See Figure 15.

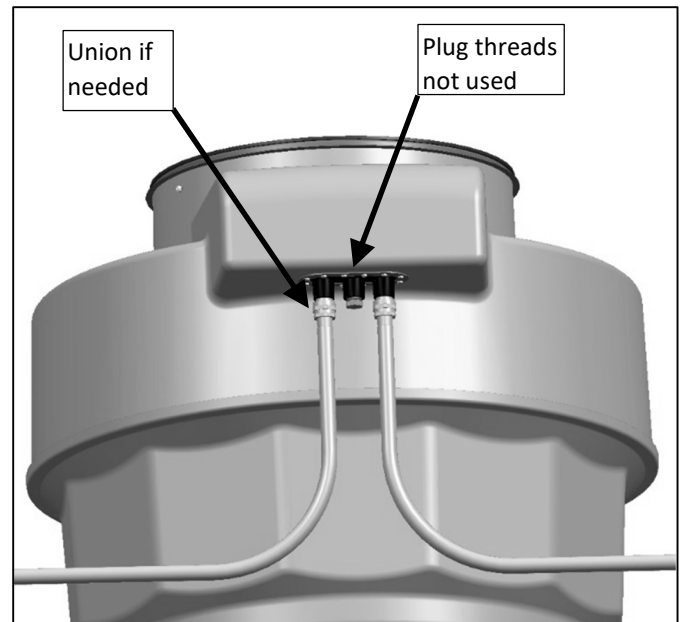


**Figure 15**

**b)** Plug any external threads that will not be used. Plug must be compatible with automotive fuels and soil fluids. Use non-hardening, gasoline resistant pipe thread compound on plugs. Torque to 100 ft-lbs.

**c)** Attach conduit to external threads on CEJ Kwik Wire junction box. It may be necessary to use unions to make this attachment. See Figure 16.

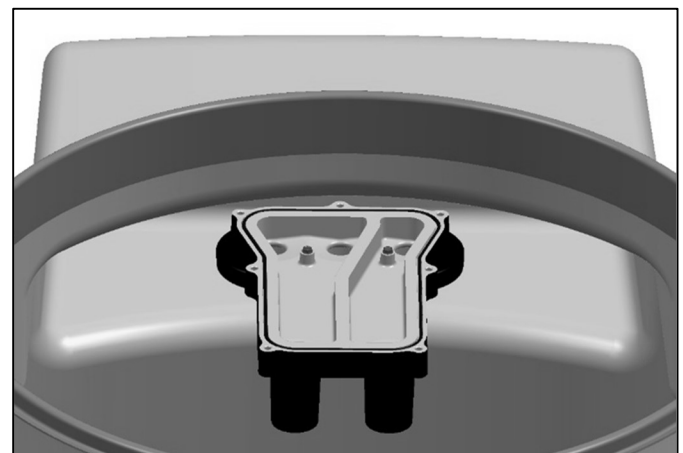
**Note:** Be careful not to damage sump during installation of conduit or plugs.



**Figure 16**

**d)** Remove cover bolts (1/2" socket) and cover from CEJ box. See Figure 17.

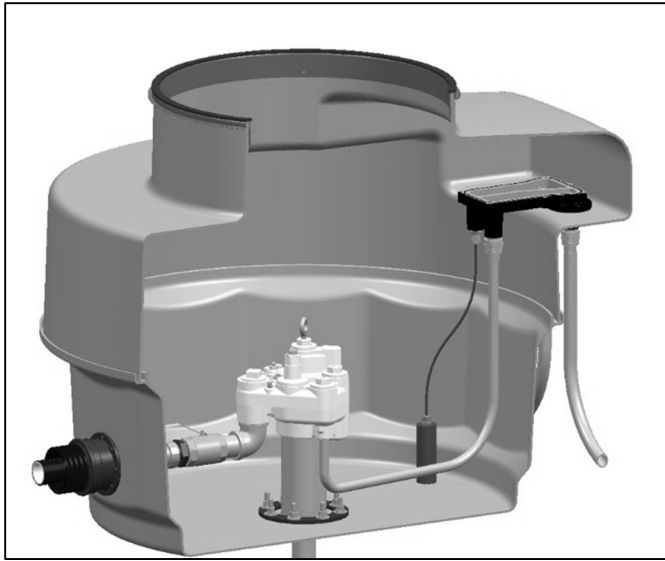
**Note:** Do not pry off cover. Be careful not to damage cover or box surface during removal. Do not handle cover roughly. Set cover aside being careful not to damage or scratch flat ground joint.



**Figure 17**

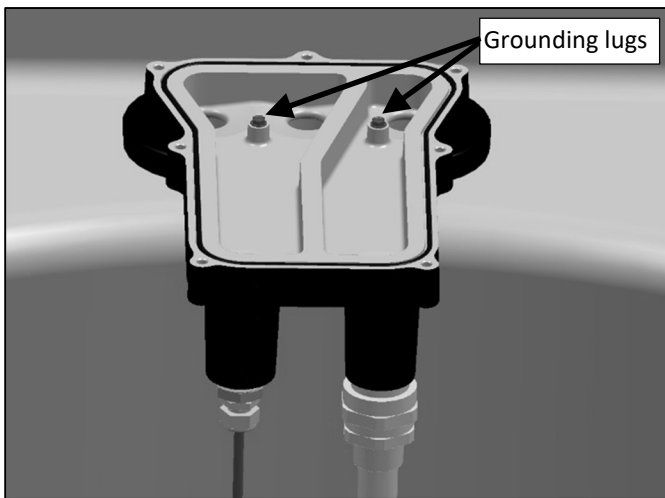
**e)** Pull wires into Kwik Wire Junction box. Ensure enough length is available to make all connections.

**f)** Attach conduit and grommets as required to internal threads on Kwik Wire junction box. Example shown in Figure 18 includes conduit for submersible turbine pump and grommet for sump sensor.



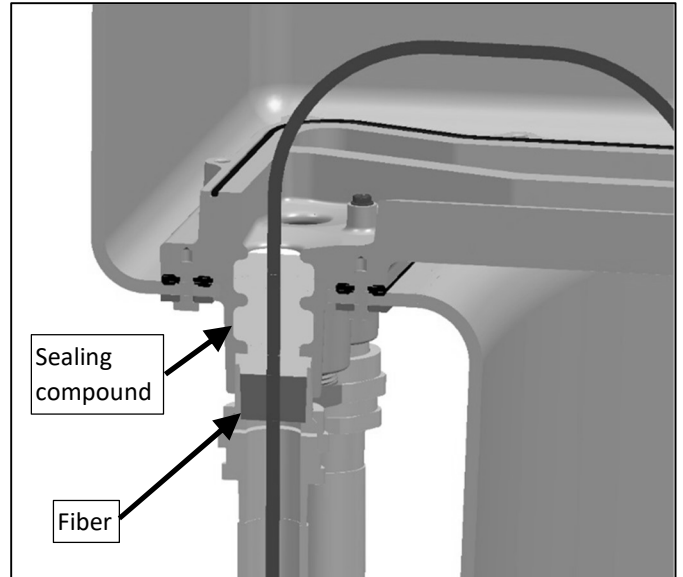
**Figure 18**

**g)** Make and test all electrical connections. Two grounding lugs are available in each box. See Figure 19.



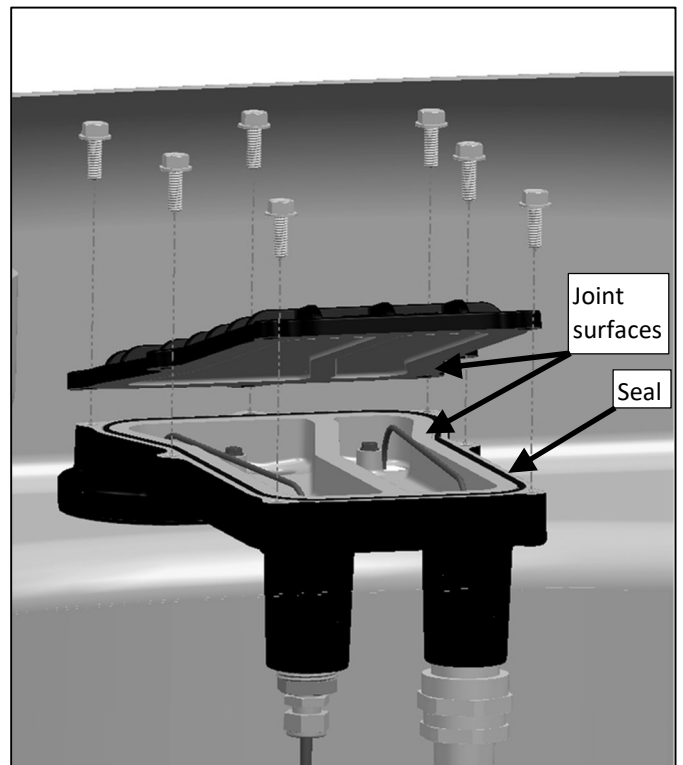
**Figure 19**

**h)** Integral sealing fittings are available at all five threaded entry points into the Kwik Wire junction box. As required by NEC and AHJ use UL approved fiber and UL approved sealing compound and pour into necessary sealing fittings. Follow instructions supplied with sealing compound. Allow compound to harden before proceeding. See Figure 20.



**Figure 20**

**i)** Ensure seal is in body groove and clean. Put cover back on box using all seven supplied bolts. Torque bolts to 12 to 20 ft-lbs. Be careful not to damage cover or box joint surface during installation. See Figure 21.



**Figure 21**

### STEP 13: LEAK TESTING

OPW recommends the following procedure for hydrostatic testing of tank sumps:

1) Visually inspect all entry boots for band clamps, compression rings and donuts for possible leak points prior to testing. Ensure all band clamps are tight. Ensure REF grommet is flush with end of entry fitting nut. Correct as needed.

**Note:** For FCS series verify torque on Kwik Wire junction box external bolts as described in Step 12a.

2) Be sure all test tubes, connector tubes or any other open secondaries into the sump are sealed and liquid tight.

3) Fill all sumps to a minimum of 1" above the highest penetration fitting or sump joint. Mark the liquid level with a permanent marker.

**Note:** For FCS series, the Kwik Wire junction box is factory installed and testing may not be required above the box. Local requirements are determined by the AHJ.

4) Hydrostatic test should be held for 1 hour or per local regulations.

5) Be sure all water is disposed of properly after completing the test.

**Note:** Should the liquid level drop during testing, visually identify the leak source. Remove water and tighten band clamps to 30 in-lbs. Entry boot compression rings should be tightened in a clockwise manner until each stud reaches 60 in/lbs. Repeat testing procedure.

As an alternate to a hydrostatic test a vacuum test can be performed on the tank sump.

**WARNING:** If vacuum testing, test the sump at a maximum of 30" inch water column or irreparable damage may occur.

### STEP 16: INSTALL COVER

Tank sumps may be supplied with two different cover styles. For FTS, FCS, & TSE-WT models with handles install using method 1 below. For TSE sumps with compression style lid install using method 2 below.

### Method 1: Tank Sump Cover with Handles

Ensure all L-handles on the cover are in the "Unlocked" position. The tank sump cover has molded in "Locked" and "Unlocked" logos as shown in Figures 22 and 23. Seat the cover on the stainless steel ring on the top hat. Press down on the cover. Turn the L-handles 180 degrees to the "Locked" position to lock the latch beneath the stainless steel ring on the top hat.

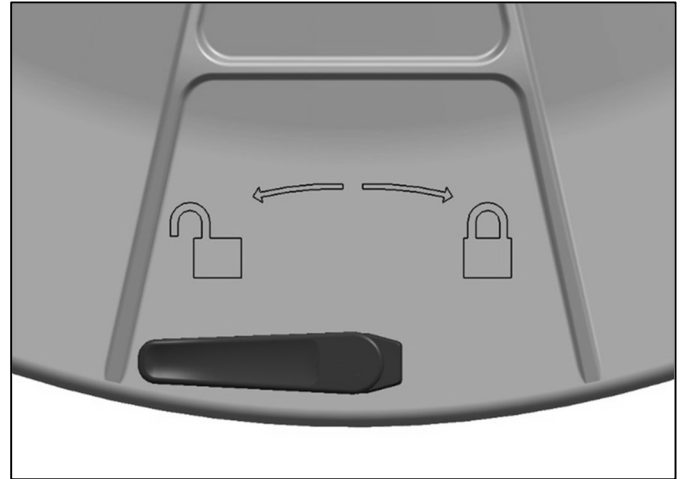


Figure 22 – Unlocked Position

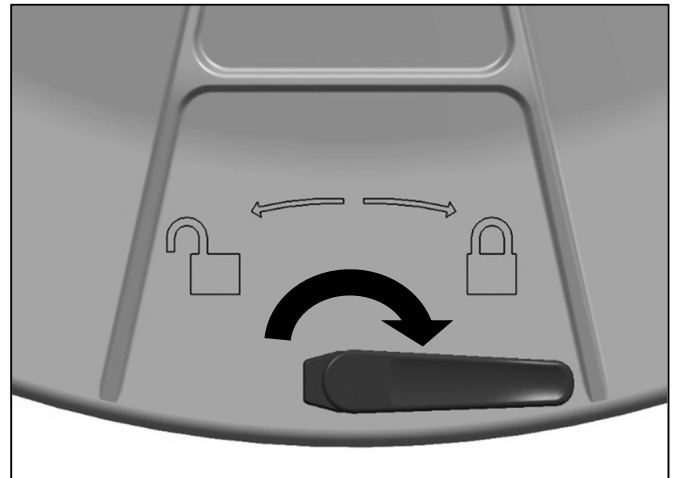
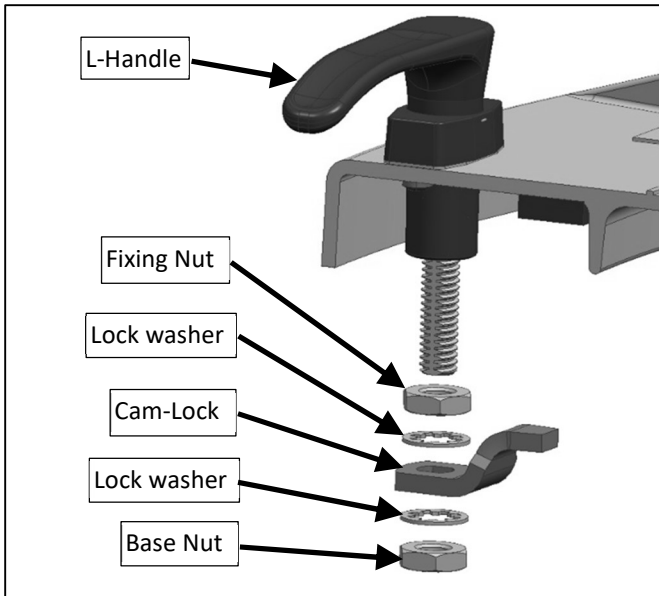


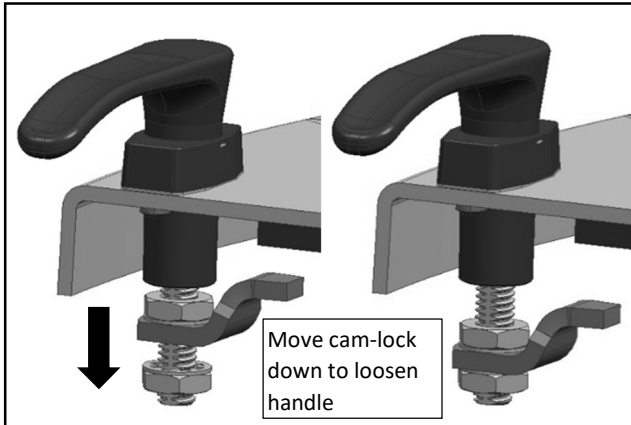
Figure 23 – Locked Position

If the L-handle fails to engage it may be necessary to adjust the 'cam-lock' height. See Figure 24.



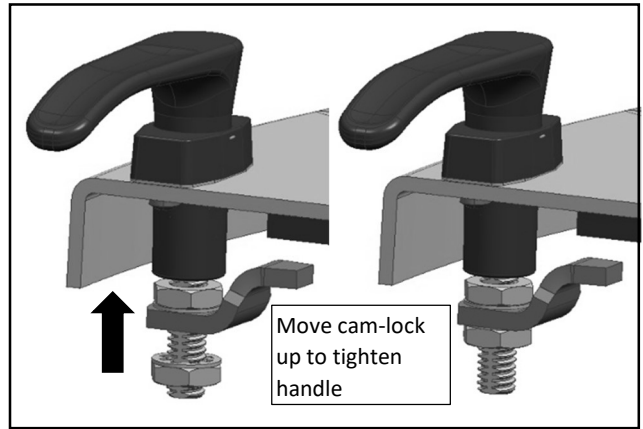
**Figure 24**

If the L-handle is not fully engaging it means the cam-lock needs to be lowered. Loosen the base nut to a lower position. Pull the cam-lock down to rest onto the base nut. Lower and tighten the fixing nut to 177 in-lbs max to secure the cam-lock. See Figure 25.



**Figure 25**

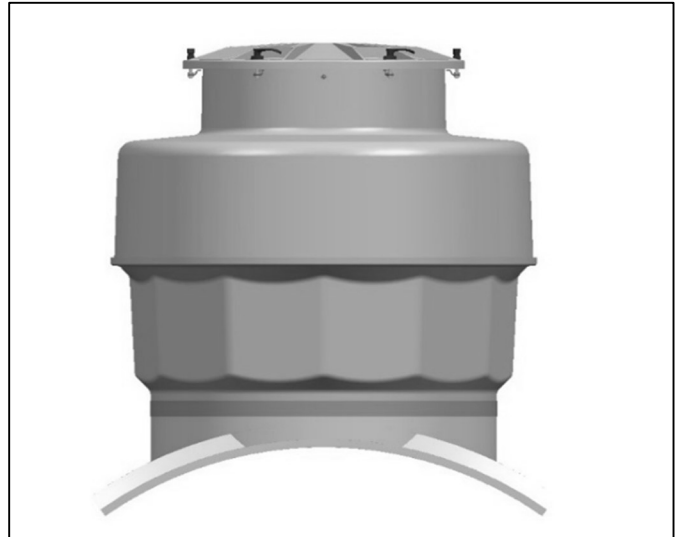
If the cover is not compressing the gasket tightly against the stainless steel ring it means the cam-lock needs to be raised. Loosen the base nut and pull the cam-lock down to rest onto the base nut and raise the fixing nut. Push the cam-lock up to the fixing nut and tighten the base nut to 177 in-lbs max to secure the cam-lock. See Figure 26.



**Figure 26**

Once the cam-lock is secure refit the cover. See Figure 27.

**Note:** It may be necessary to further adjust the cam-lock height until the optimal position is located.



**Figure 27**

## Method 2: TSE Compression Style Cover

For the TSE compression style cover apply a bead (approximately 0.25") of SL-1100 sealant (sold separately) to the inside of the groove on the seal all the way around. See Figure 28. Seal is shown upside down as this is the easiest orientation to apply the bead of sealant.

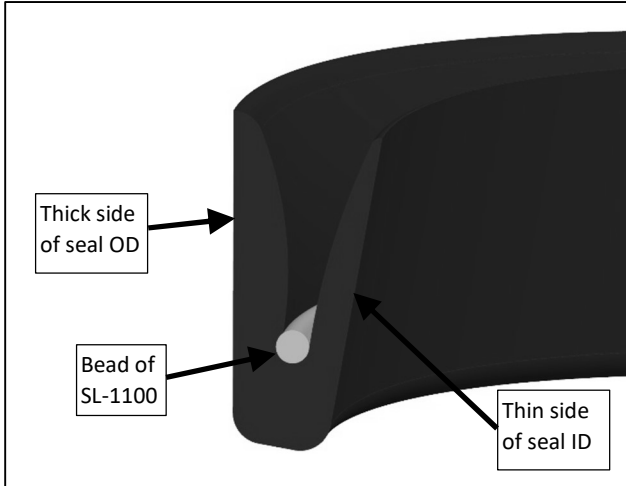


Figure 28

After sealant has been applied to the seal install the seal on the TSE top hat as shown in Figure 29. The thick side of the seal should be on the outside of the top hat and the thin side of the seal should be on the inside of the top hat. Adhere seal to top hat by applying pressure to the top of the seal to seat.

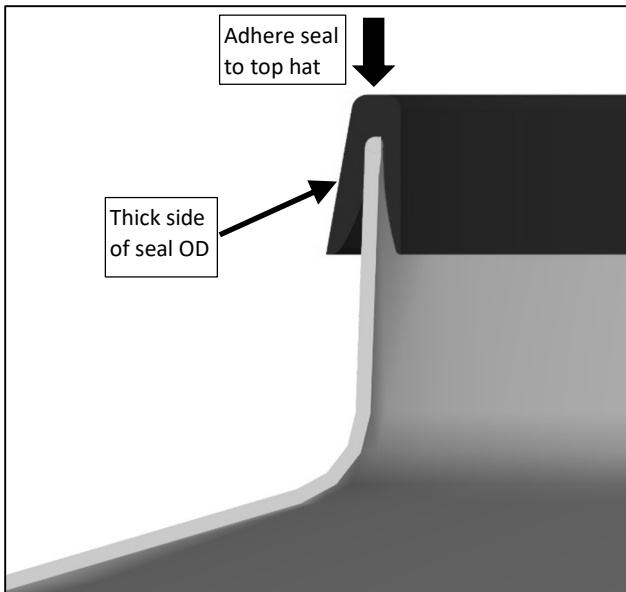


Figure 29

Install cover evenly over seal as shown in Figures 30 & 31. Allow sealant to cure for 24 hours before removing cover.

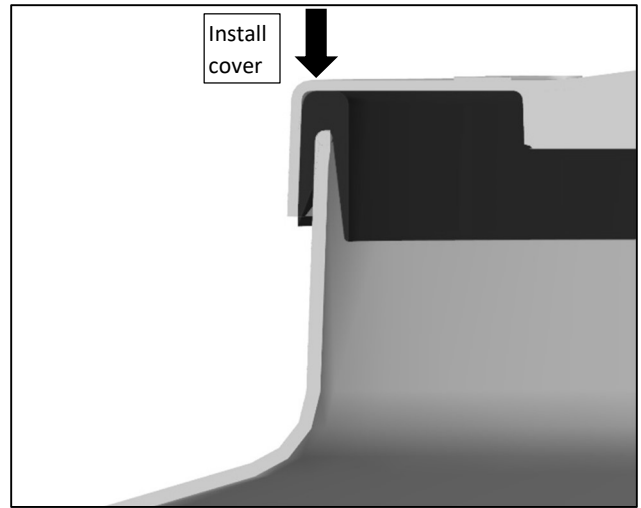


Figure 30

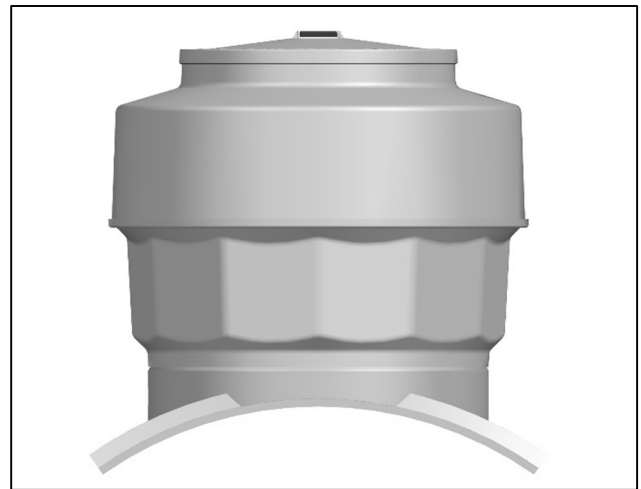


Figure 31

**NOTE:** TSE covers include a handle in the center of the cover to assist in removal of the cover. The handle can be lifted by hand or with the use of an FL7 or FL7A lifting handle. The slot in the handle allows for attachment of the FL7 or FL7A. See Figure 32.

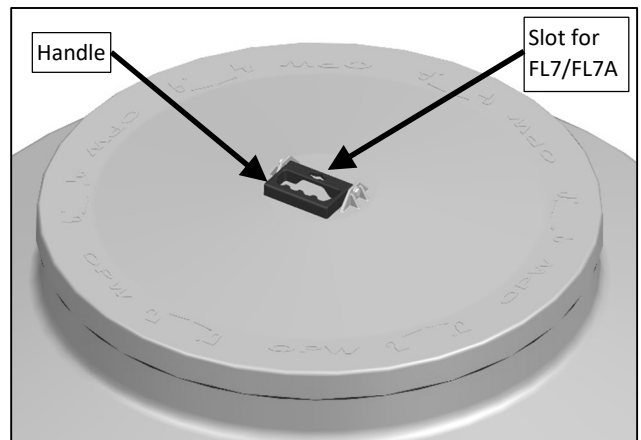
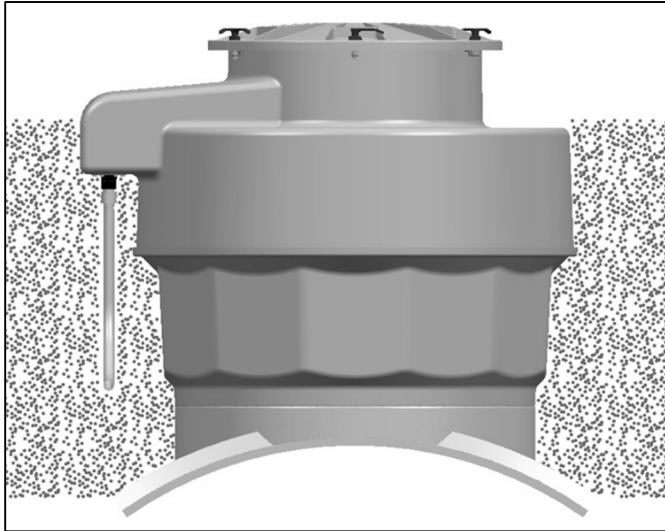


Figure 32



**STEP 15: BACKFILL**

Once the sump and top hat have successfully passed tightness testing, the area around the sump can be carefully backfilled. Rounded pea gravel with a minimum diameter of 1/8" and a maximum diameter of 3/4" must be used for backfill around OPW Fibrelite / FibreTite / ElectroTite Tank Sumps. To prevent sump damage, avoid dumping pea gravel directly onto the Tank Sump when backfilling. Backfill equally around the sump in layers to prevent damage or deformation. Ensure proper backfill with no voids under tank sump bottom, middle joint, and Kwik Wire junction box area if present.



**Figure 33**

**STEP 16: NOTCH MANHOLE SKIRT – optional**

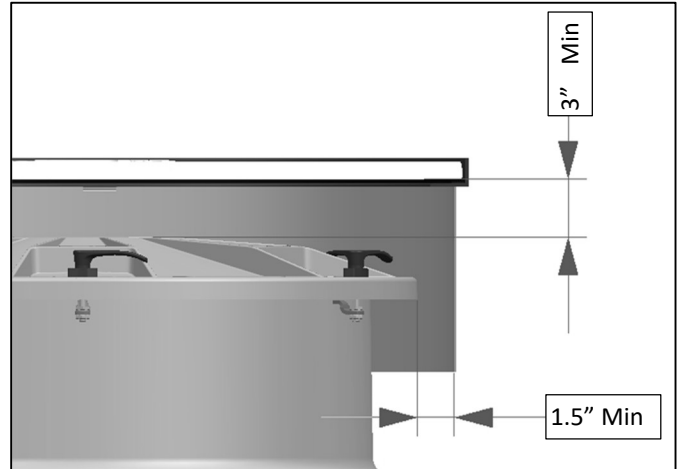
This Step only applies to FCS series sump installations with Kwik Wire Junction Box. Proceed to Step 17 for FTS & TSE series sumps.

As previously mentioned in the table in Step 3, it may be necessary to notch the manhole skirt to ensure the required minimum 3 inch clearance between any load-bearing item and the tank sump is met. See Appendix C for figures with the exact notch dimensions required for OPW / Fibrelite manholes. Notch manhole accordingly to ensure adequate clearance. See table below for summary of notch sizes required with OPW manholes.

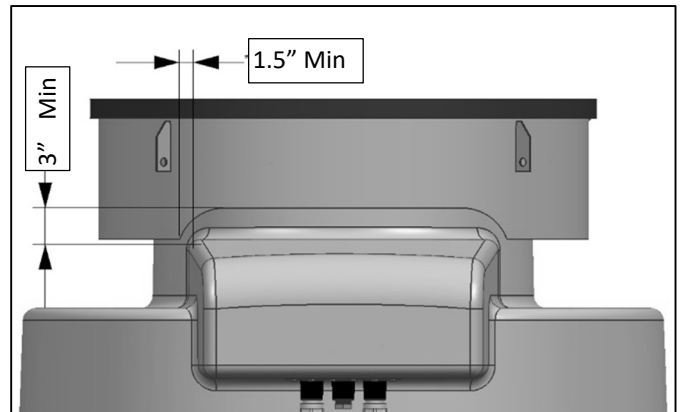
OPW / Fibrelite Manhole Style	Dimension B (inch)	Notch Size
39CD / 44CD -XX10	5.5 to 8	26" wide x 2.5"
37MAT / 42MAT	5.5 to 10	26.3" wide x 4.6"
FL90 / FL100 -BSK12	8.2 to 12.4	26.3" wide x 4.2"

**STEP 17: SET MANHOLE SKIRT**

Set manhole skirt and ensure adequate clearance. A minimum 3 inch vertical clearance is required between any load-bearing item and the tank sump. A minimum of 1.5 inches clearance between top hat and skirt is highly recommended on all sides to allow adequate water migration away from sumps. See Figures 34 & 35.



**Figure 34**



**Figure 35**

## STEP 18: INSTALL MANHOLE

Install manhole per installation instructions.  
See Figure 36.

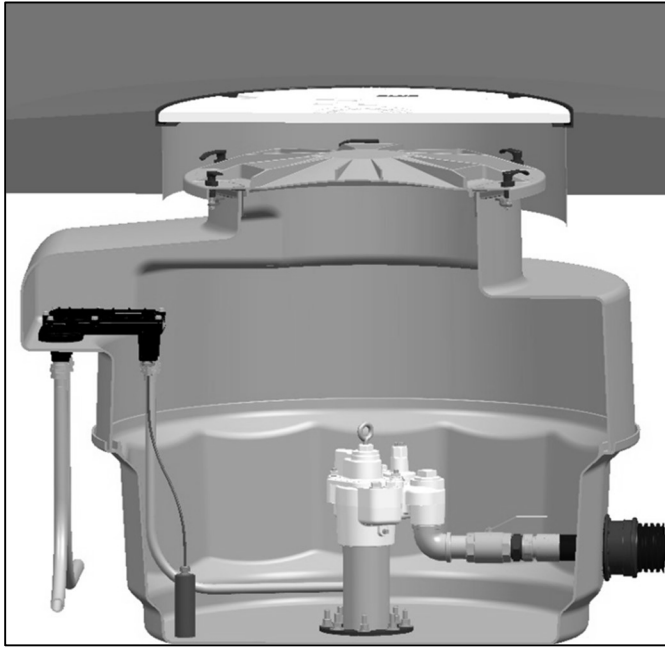


Figure 36

## Operation and 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.

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. 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.

Note: Common sense and good judgment should always be exercised. The contractor's understanding of all related site conditions prior to starting the project is essential. If the contractor does not have a clear understanding of the required work and site conditions, the contractor is advised to seek clarification prior to starting any portion of the project.

**Important: Leave these instructions with Station Operator**

**Appendix A**

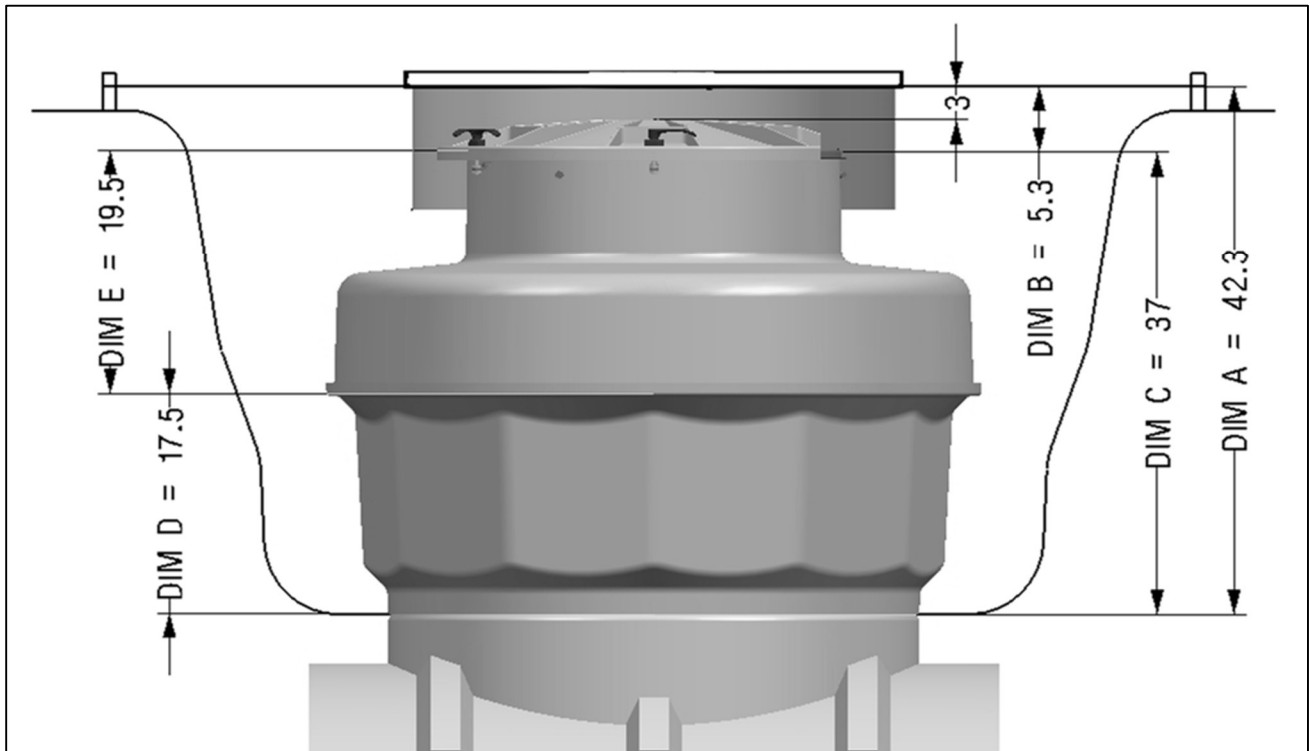
Sample Height Calculations (no extensions)

**Sample Calculation #1**

Sump Model = FTSM-4233CR

Manhole Model = 39CD-PL10

Dimension A, string line to tank	=	42.3 inch
Dimension B, string line to top hat dimension from table	=	5.3 inch
Dimension C, tank sump height without cover, A-B, 42.3-5.3	=	37 inch
Check dimension C, 37 inch is in range of 30 inch to 43.5 inch	=	CHECK
Dimension D, base height from table	=	17.5 inch
Dimension E, tank sump top hat height, C-D, 37-17.5	=	19.5 inch
Dimension F, trim distance, 25-E, 25-19.5	=	5.5 inch



FTSM-4233CR with 39CD-PL10

**Sample Calculation #2**

Sump Model = FCSD-1-4233SB

Manhole Model = FL90-BSK12

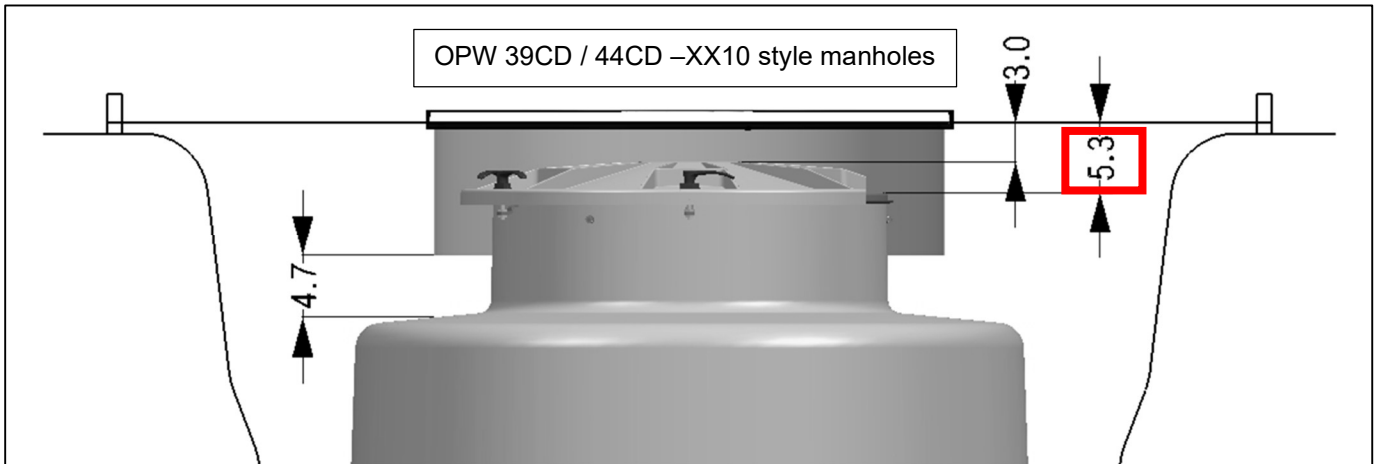
Mounting Flange = TFA-4090

Dimension A, string line to tank	=	61.2 inch
Dimension B, string line to top hat dimension from table	=	8.2 inch
Dimension C, tank sump height without cover, A-B-2, 61.2-8.2-2	=	51 inch
Check dimension C, 51 inch is in range of 42 inch to 51 inch	=	CHECK
Dimension D, base height from table	=	26 inch
Dimension E, tank sump top hat height, C-D, 51-26	=	25 inch
Dimension F, trim distance, 25-E, 25-25	=	0 inch (no trim needed)

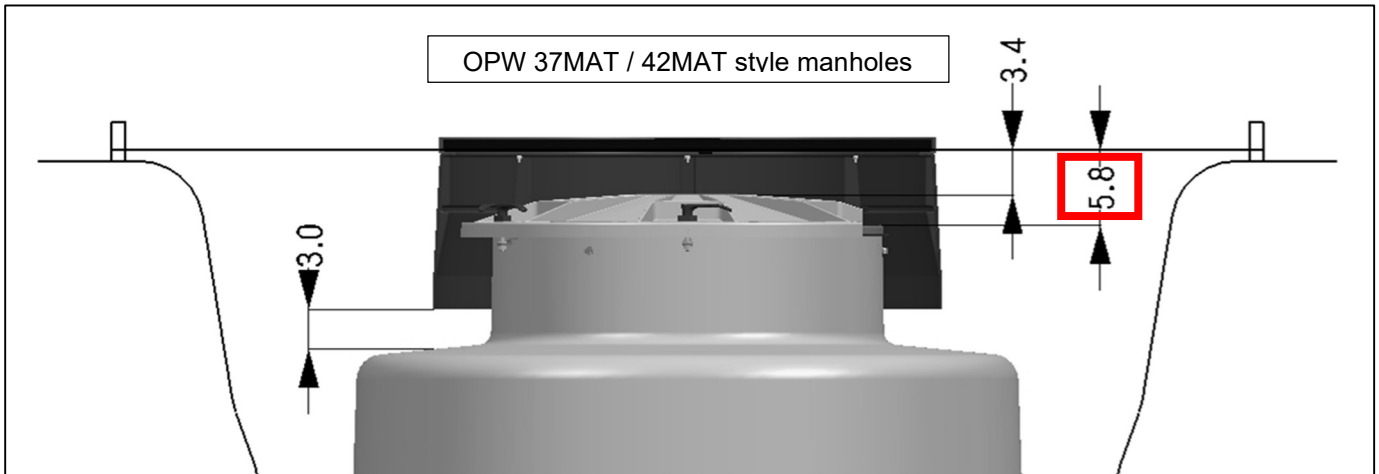
**Appendix B**

Required Minimum Clearances for FTSM, FTSD, and TSE series.

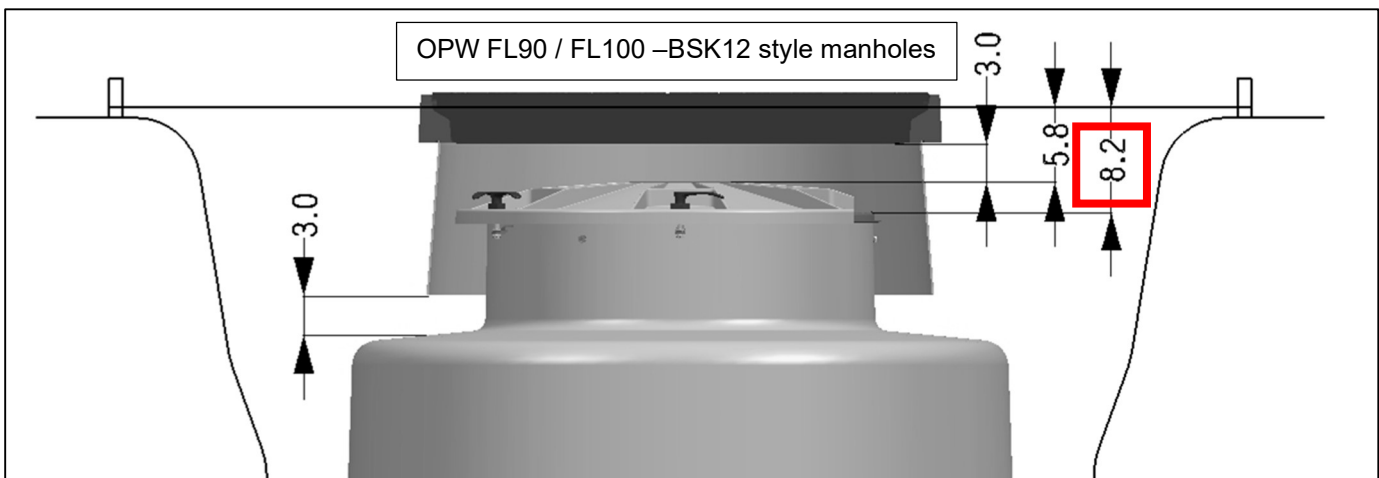
For all scenarios shown below the manhole ring is set 1" above string line for slope.



To ensure 3" minimum clearance between bottom of manhole cover and tank sump cover requires **5.3" minimum** from string line to top hat.



To ensure 3" minimum clearance between bottom of skirt and top hat requires **5.8" minimum** from string line to top hat.

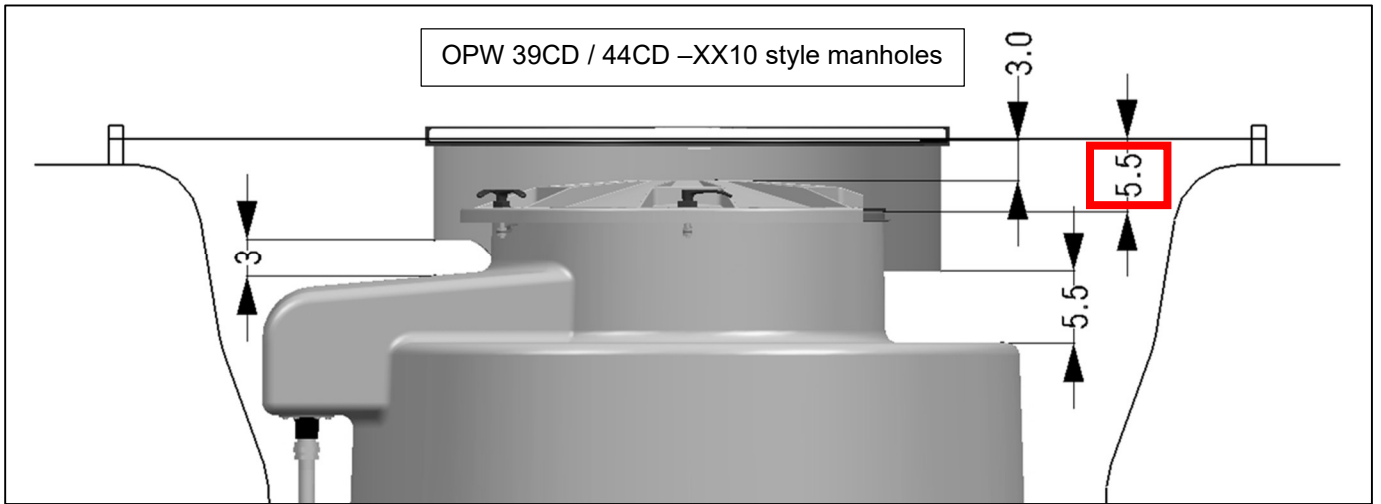


To ensure 3" minimum clearance requires **8.2" minimum** from string line to top hat.

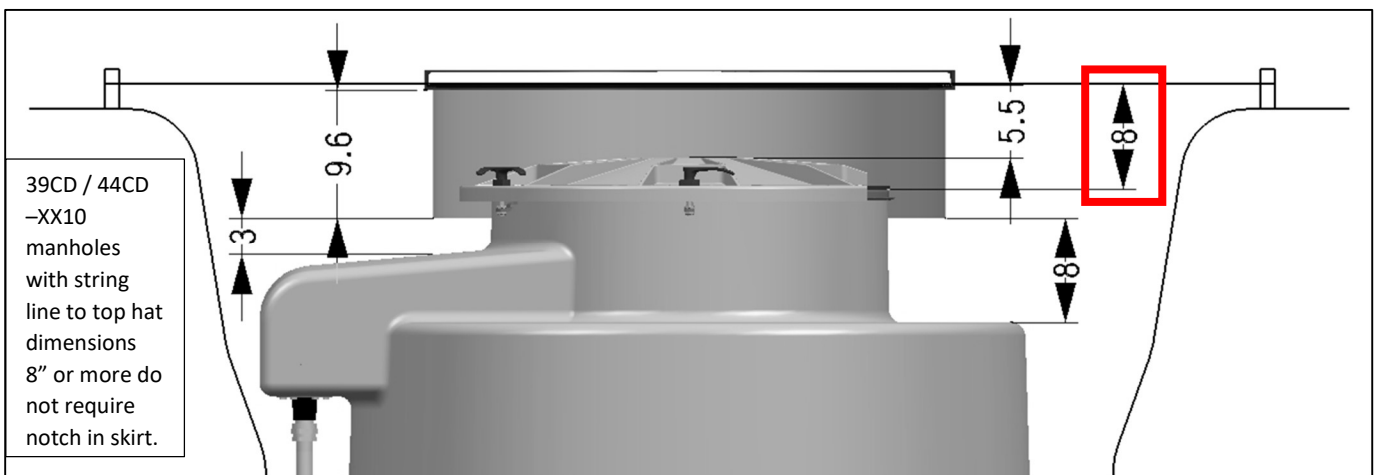
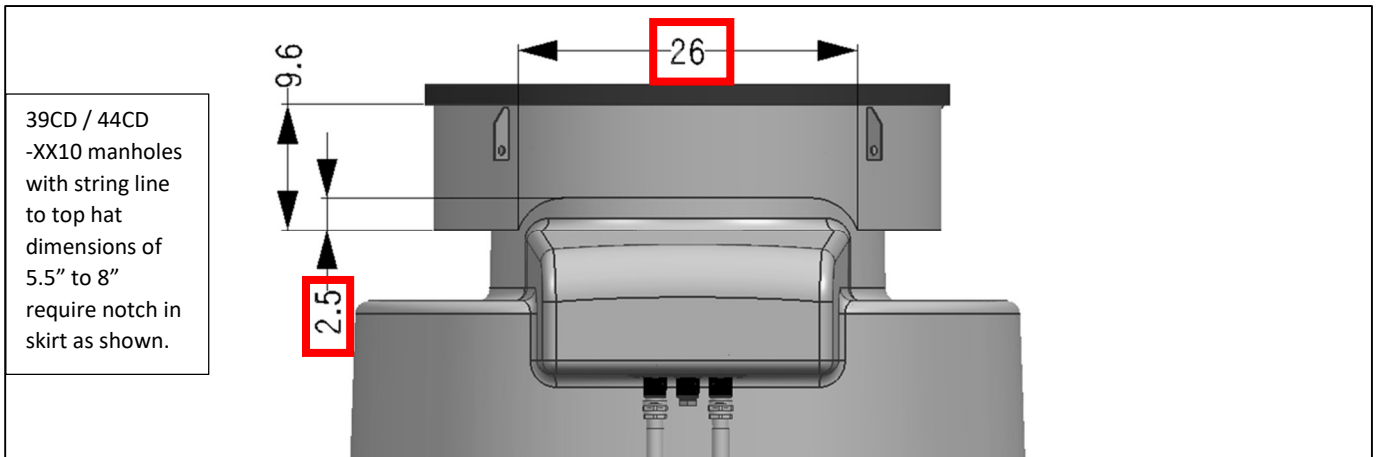
**Appendix C**

Required Minimum Clearances for FCSM and FCSD series.

For all scenarios shown the manhole ring is set 1" above string line for slope.



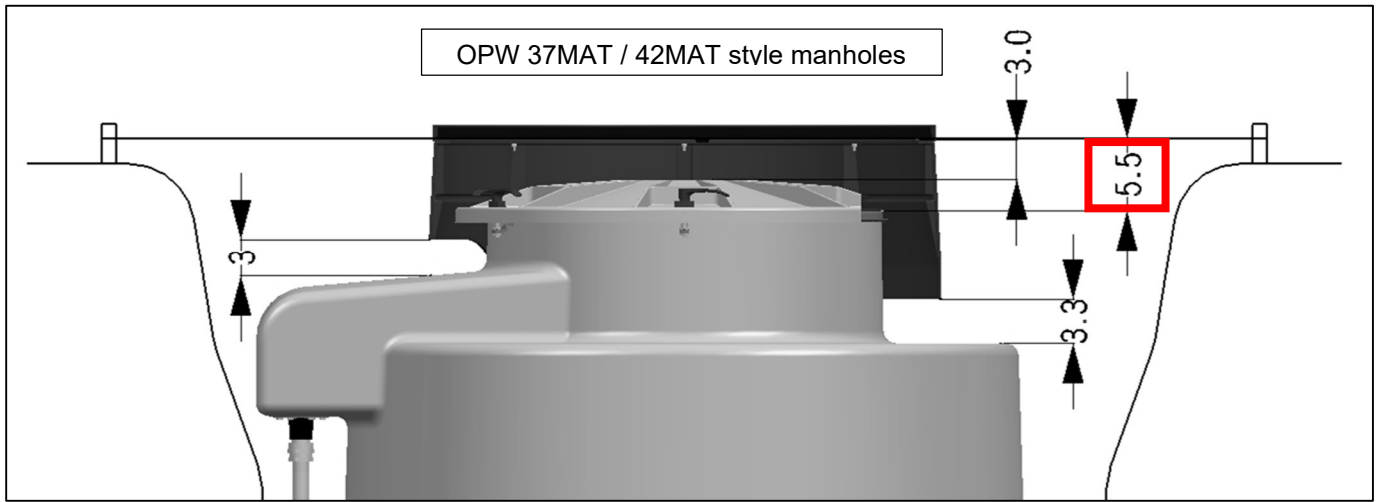
To ensure 3" minimum clearance between bottom of manhole cover / tank sump cover and bottom of skirt / top hat requires **5.5" minimum** from string line to top hat. This configuration also requires a 26" wide x 2.5" notch be cut in the skirt as shown below.



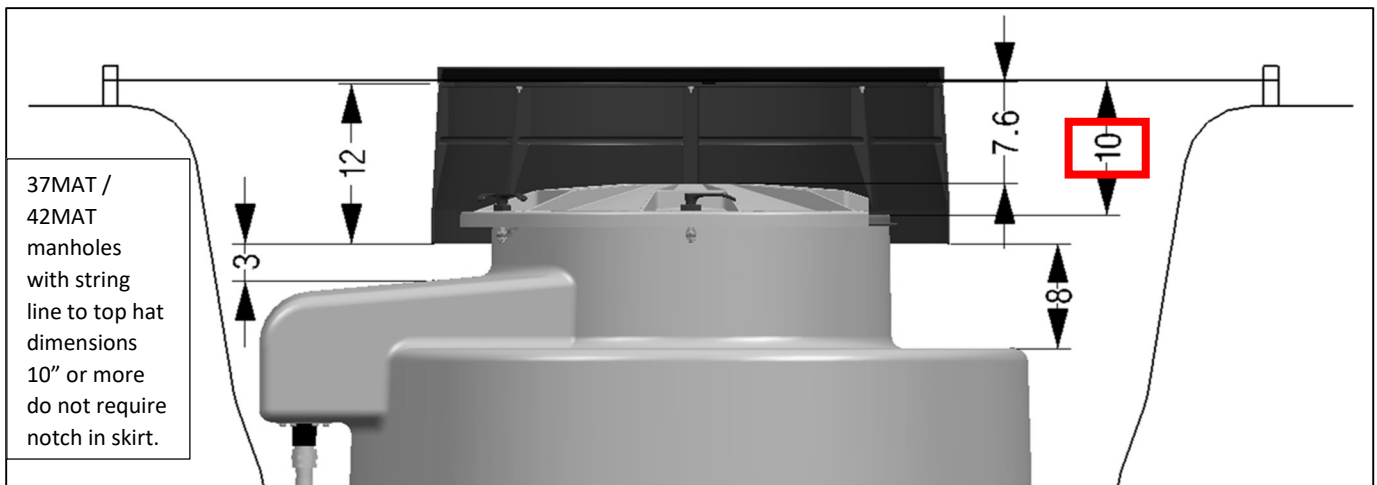
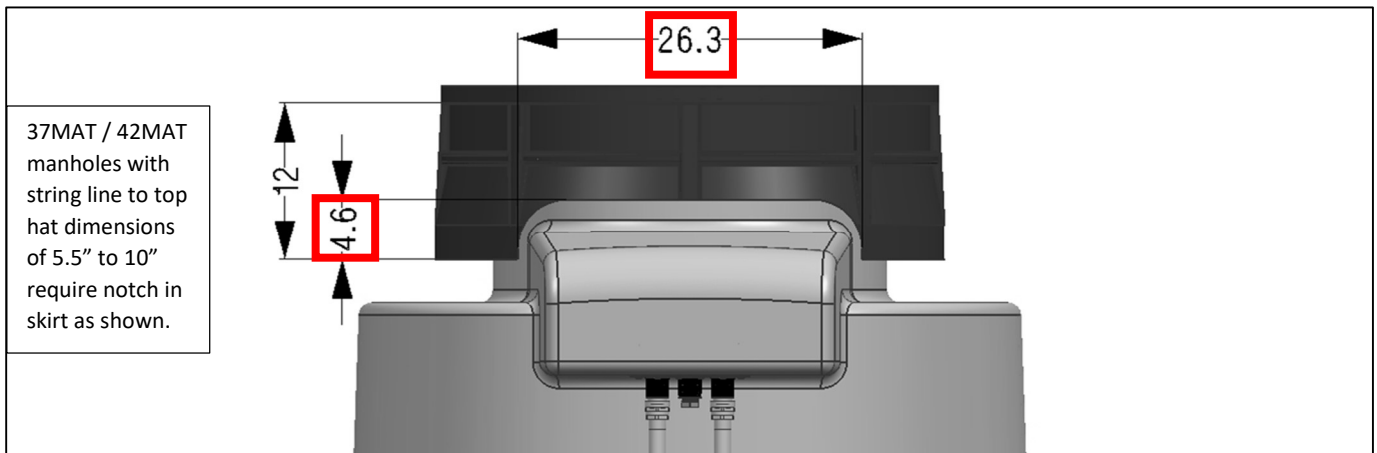
To ensure 3" minimum clearance between bottom of skirt / top hat requires **8" minimum** from string line to top hat for an untrimmed skirt with no notch.

**Appendix C (continued)**

For all scenarios shown the manhole ring is set 1" above string line for slope.



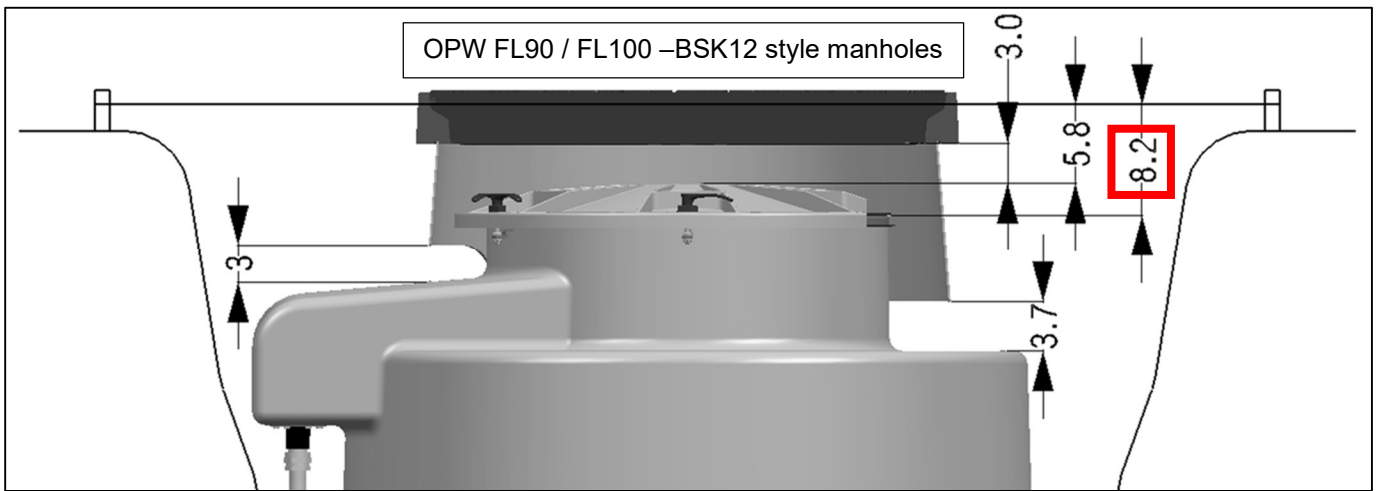
To ensure 3" minimum clearance between bottom of manhole cover / tank sump cover and bottom of skirt / top hat requires **5.5" minimum** from string line to top hat. This configuration also requires a 26.3" wide x 4.6" notch be cut in the skirt as shown below.



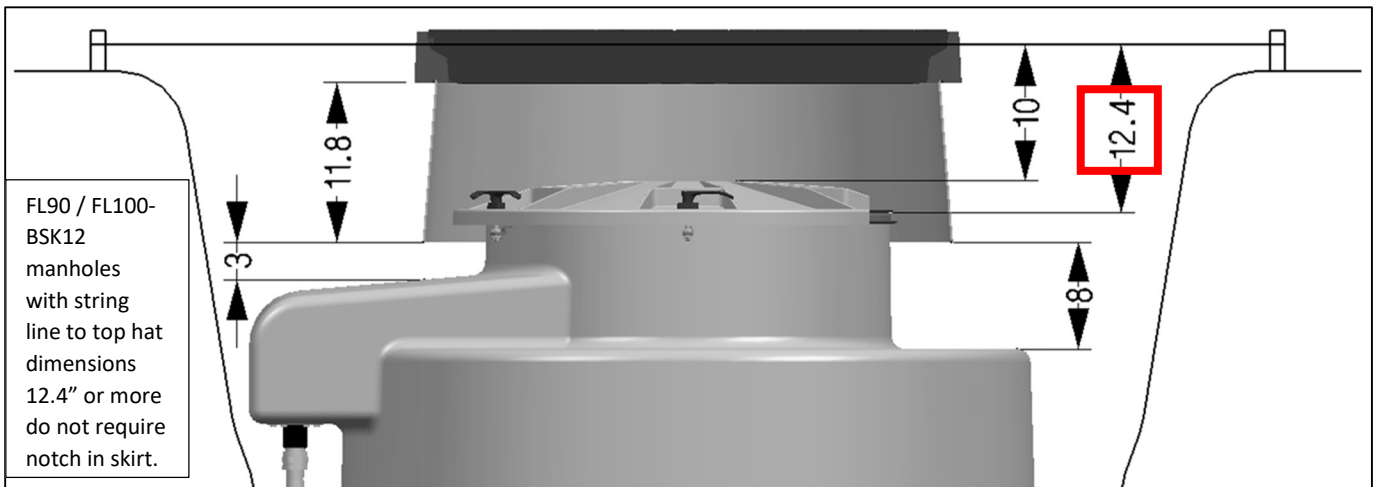
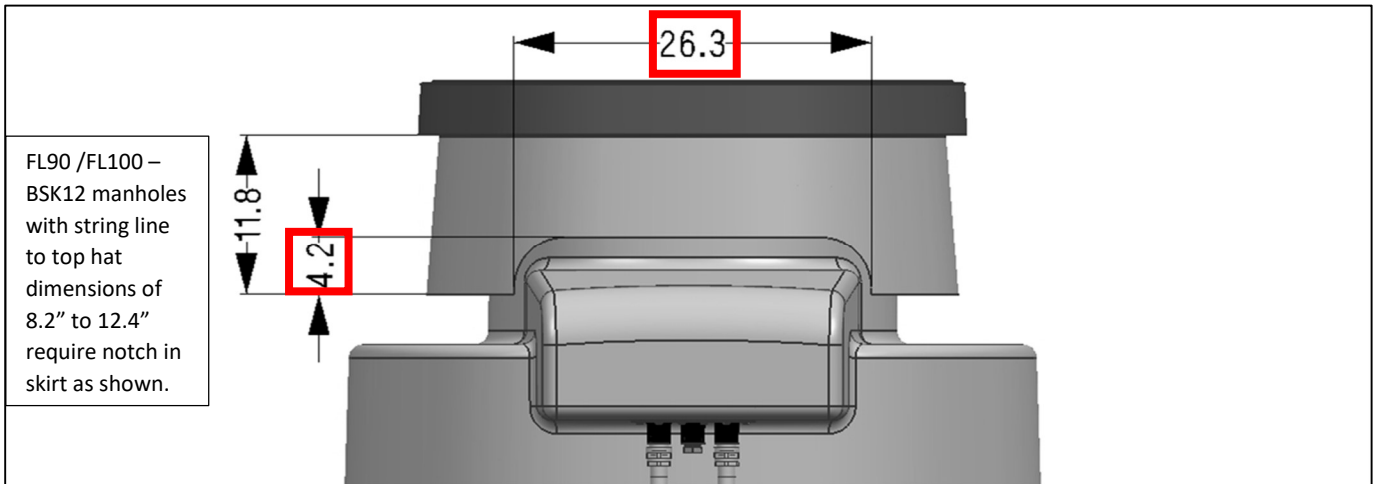
To ensure 3" minimum clearance between bottom of skirt / top hat requires **10" minimum** from string line to top hat for an untrimmed skirt with no notch.

**Appendix C (continued)**

For all scenarios shown the manhole ring is set 1" above string line for slope.



To ensure 3" minimum clearance between bottom of manhole cover / tank sump cover and bottom of skirt / top hat requires **8.2" minimum** from string line to top hat. This configuration also requires a 26.3" wide x 4.2" notch be cut in the skirt as shown below.



To ensure 3" minimum clearance between bottom of skirt / top hat requires **12.4" minimum** from string line to top hat for an untrimmed skirt with no notch.

**Appendix D**

Sample Height Calculation with Extensions.

**Sample Calculation**

Sump Model = FTSD-4233CR

Manhole Model = 37MAT-PL12

Dimension A, string line to tank = 76 inch

Dimension B, string line to top hat dimension from table = 5.8 inch

Dimension C, tank sump height without cover, A-B, 76-5.8 = 70.2 inch

Check dimension C, 70.2 inch is out of range of 30 to 43.5 inch = EXCEEDS, extension needed  
FCS42-EX12 extension will be needed.

Dimension D, base height from table = 25 inch

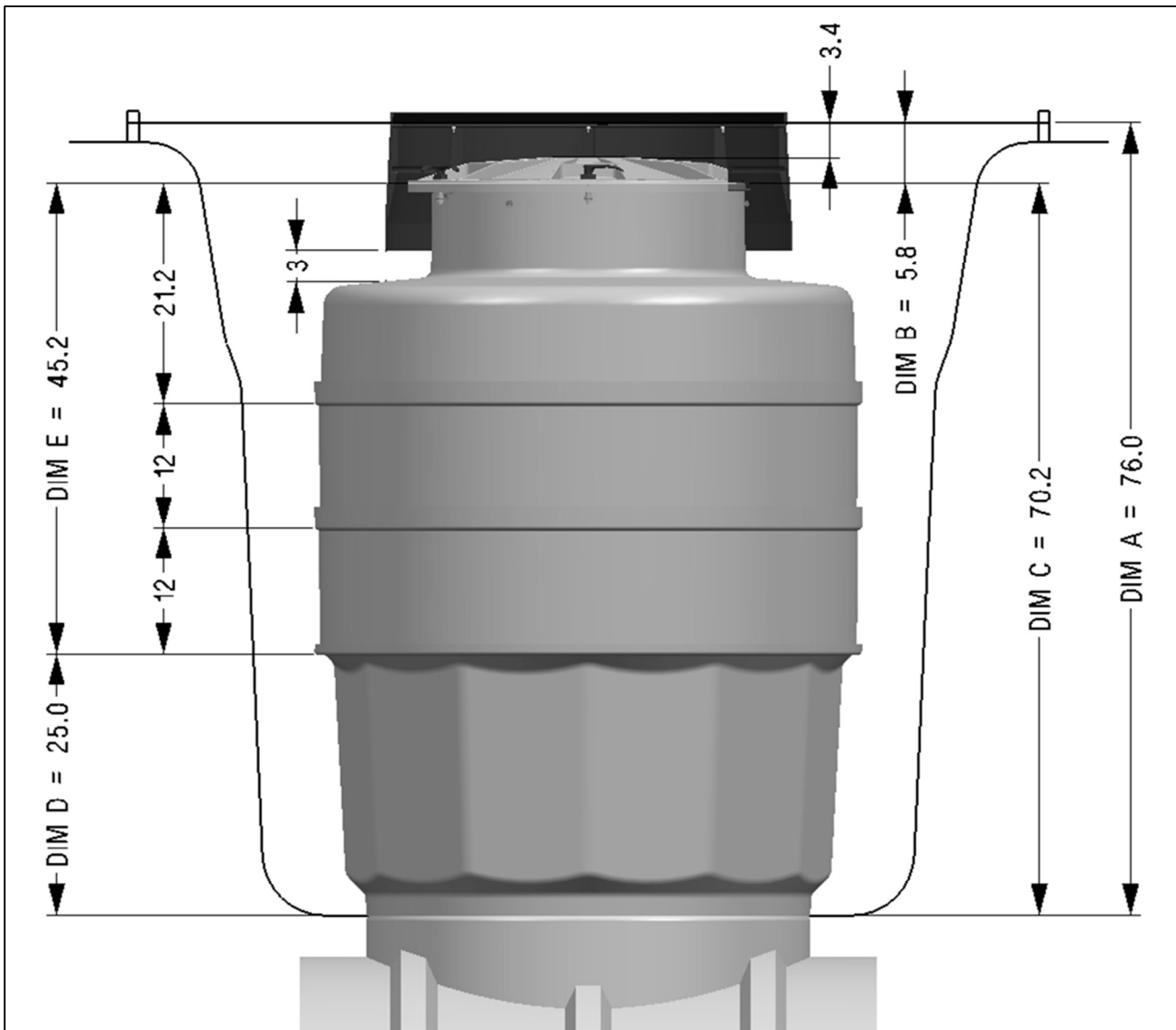
Dimension E, tank sump top hat height, C-D, 70.2-25 = 45.2 inch

Determine number of extensions needed to extend standard 25" top hat to meet Dimension E.

Extensions are available in 12 inch increments.

For this configuration 45.2 inch – 24 inch (2 extensions) = 21.2 inch top hat height. Trim top hat to match.

Dimension F, trim distance, 25-E, 25-21.2 = 3.8 inch



FTSD-4233CR with 37MAT-PL12





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