

COS Series Concrete Oil/Water Separator Engineering Specification

COS-2 through COS-35,000

SECTION 1.0 OIL/WATER SEPARATOR

Performance

The Pan America Environmental COS Series Oil/Water Separators are designed to produce an effluent concentration of 10 mg/l or less of oil droplets 30 micron and larger of non-emulsified, free and dispersed oils. By virtue of our Flopak coalescing media and tank designs readily settleable solids are also removed.

1.01 Design and Engineering

The oil/water separator will be designed and fabricated per the following specifications. Rectangular tankage with features as described designed per API #421 Design & Operation of Oil/Water Separators Manual and Stokes law. The design will incorporate flexible flow rating capability based on application parameters.

1.01.1 Pan America Environmental (PAE) will provide general tank design, internal tank dimensioning, design and internal component location/installation drawings for use in customer tank construction and assembly. Component installation hardware shall be specified. Concrete type and pcf rating, wall thickness and soil loading calculations will be provided by customer or customer's engineers for use by the contractor in tank construction.

1.01.2 If prefabricated, concrete vault, PAE will provide separator drawings with internal component installation drawings based on tank design. Where provided or required, prefabricated vault manufacturers shall provide appropriate design calculations, certifications or authority acceptance of design for over the road transport strength and soil loading capability. See prefabricated tank specification for tailored specification.

1.02 Influent Chamber

Influent flow enters the clog proof influent diffuser pipe and is immediately spread out across the depth and width of the chamber. Any readily settleable solids drop to the bottom of the separation chamber. Optional solids chamber: if provided, a V-shaped solids accumulation chamber or inverted pyramid type hopper(s) can be located directly under the Flopak coalescing media pack. The optional screw auger sludge conveyor and sludge pumpout systems are recommended for solids removal.

1.03 Oil/Water Separation Chamber

The separation chamber is to be packed with Flopak, cross-fluted coalescing media. The media pack will be designed to create a quiescent zone, a laminar flow pattern to facilitate the impingement of oil on the media, and will provide numerous oil droplet impact sites and changes of flow direction. The media shall have a 60-degree cross-flute angle.

1.04 Cylindrical Oil Skimmer (optional)

The separator shall be provided with an adjustable cylindrical oil skimmer. The skimmer pipe will be designed to rotate for adjustment. The oil skimmer is to be located at the effluent end of the separation chamber. Skimmer pipe is to be constructed of carbon steel with a coal tar epoxy coating. The skimmer pipe will be directly connected to an oil reservoir for temporary storage of skimmed product. The opposite end of the skimmer shall be supported via an adjustable steel suspension bracket to maintain skim pipe in level horizontal position. The skimmer shall have a hand operated adjusting handle to rotate the skimmer for adjustment.

1.05 Solids Accumulation Chamber (when provided)

The separator shall have a V-shaped or inverted pyramid type solids accumulation chamber located under the Flopak coalescing media. This chamber will provide temporary solids storage. The chamber walls are to be pitched at 45 degrees to assure simple and thorough solids removal.

1.06 Solids Screw Auger System (when provided)

When the V hopper, solids accumulation chamber is provided, an auger can be provided to convey the settled solids to the sludge pumpout suction pipe. The auger system shall consist of a direct drive, drive shaft system with a reduction gear motor, steel drive shaft, bevel gear, screw type auger, support bearings all required shaft couplings and drive overload protection device.

1.06.1 GEAR MOTOR - A reduction gear motor shall be provided. The gear motor shall be sized and designed to provide sufficient drive torque within an acceptable RPM range. The gear motor will include a TEFC motor and vertically adjustable, steel mount base to allow ease of attachment to drive shaft. Base will include a shaft safety guard for above water contact safety. Base will be epoxy or enamel coated (6-dft min.) for unprotected weather duty.

1.06.2 DRIVE SHAFT - A carbon steel, hollow pipe, heavy walled driveshaft with keyed, 304 stainless steel end shafts will be provided. The shaft and end shafts will be designed to accommodate a rpm equal to 2 times the maximum speed of the auger system and 1.5 times the maximum torque attained by gear motor. The shaft shall be straight, true and coal tar epoxy coated following SSPC-SP10 surface preparation.

1.06.3 BEVEL GEAR - Submergence rated, dual seal, 90-degree input/output, 1 to 1 ratio bevel gear. The heavy-duty bevel gear shall have stainless steel input/output shafts, adjustable mounting bracket(s), cast iron housing and coal tar epoxy external coating

1.06.3a The bevel gear will have an adjustable gear lube reservoir for location above grade to provide positive pressure on the bevel gear housing to resist water infiltration through the shaft seals and allow convenient gear box lubrication. Connection tubing and reservoir mount hardware will be provided. Customer to attach tubing to tank wall, attaching hardware by customer.

1.06.4 SCREW AUGER - The screw auger shall be sized and construction compatibility matched for the application. Required bearings shall be non-lube, HDPE with stainless steel mount brackets, hanger bearings and hardware. Bearing brackets can be steel with coal tar coat or protective electro-deposition plating where accepted.

1.06.4a Screw auger will consist of a 304 stainless steel keyed driveshaft and unkeyed end shaft. Shaft to auger attaching hardware shall be stainless steel.

1.06.5 OVERLOAD COUPLING DEVICE - A torque overload device shall be provided between the gear motor output shaft and drive shaft. The device shall be rated and designed to protect the drive system from instantaneous and extended auger stoppage or solids overloading.

1.06.5a All the shaft to shaft female couplings are to be designed to accommodate the system torque and will be keyed. Materials of construction are to be corrosion resistant.

1.06.6 TORQUE LOADING - The gear motor, drive shaft, bearings, bevel gear and screw auger shall be sized, designed and fabricated in accordance with torque loadings required to convey a 100% specific solids loading on the screw auger. Loading calculations as provided by auger manufacturer shall be provided indicating auger size, horsepower and torque requirements based on solids type and volume being conveyed.

1.07 Oil Retention Baffle

A steel oil retention baffle shall be provided to retain all separated oils within the separation chamber. The baffle shall stretch from one sidewall to the opposite wall and shall be provided with sufficient height to stop any bypass of water or oils over the top and around sides during normal operation. The baffle shall be constructed of concrete. The baffle shall be designed to support it's own weight and the weight of any peripheral assemblies/equipment attached to it.

1.08 Effluent Weir

The effluent end of the tank is to be provided with an adjustable, stainless steel water weir plate for installation on the concrete water baffle.

1.09 Clean Water Effluent Chamber

The cleansed water will flow under the oil retention baffle, over the water weir and into the effluent chamber. This chamber shall be provided with an exit pipe sized for the maximum anticipated flow. A sheen baffle can be provided if required to

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trap sheens within this chamber. Discuss sheens and sheen baffle with Pan America prior to establishing a final specification.

1.10 Separator Cover (optional)

The separator is to have a cover that provides complete closure of the tank. The separator cover will be mounted to the tank to provide a vapor seal and/or coverage for people or vehicular traffic. One or more access ways shall be provided to allow Flopak media to be removed and reinstalled and will allow access to all parts of the tank for inspection and maintenance. Cover can be concrete, steel or Geo-textile type of cover. Discuss with Pan America prior to final specification.

1.11 Handrails (when provided)

When tank is at grade, uncovered or can be a safety concern handrailings will be supplied around the entire perimeter of the tank.

1.11.1 HANDRAILINGS - will be designed per OSHA guidelines. Construction shall be 1 ½" carbon steel pipe with safety yellow, industrial epoxy coating and mount feet located at bottom of vertical pipe for bolt attachment to concrete.

1.11.2 SIGNAGE - shall be included to indicate warning of rotating equipment and water danger where required or desired.

1.12 Fittings

All fittings 3" and smaller are to be FNPT coupling. Fittings 4" and larger are to be 150# FF ANSI flange.

Section 2.0 Materials of Construction

2.01 Concrete Construction

Tank shell, integral baffles and external structural members shall be constructed of concrete typically used for below grade tank applications. Prefabricated concrete vaulting is allowed where possible or accepted and as it fits into the design, sizing and performance requirements of the project.

2.02 Steel Component Surface Preparation and Coating

Interior (wetted) component surfaces shall be prepared to an SSPC-SP10 near white metal blast. Exterior (non-wetted) surfaces shall be prepared to an SSPC-SP6 commercial blast. All wetted surfaces of steel components, coating shall be self-priming, coal tar epoxy (14 dft). Where desired 304 stainless steel can be provided in place of coated steel (optional).

2.03 Piping (when provided)

Internal/external piping shall be ASTM, A-53 steel, iron, polyethylene or PVC where allowed and practical. Plastic piping shall be compatibility matched to product being separated and must withstand rigors of application.

2.03.1 Pipe Seals

Tank wall penetrations shall provide double seals between tank pipe and concrete. Seal material will be matched to application contaminants (Buna-N to be minimum required if seals can contact oils/fuels).

2.04 Flopak Coalescing Media

Cross-fluted, oleophilic, PVC construction Flopak coalescing media shall be provided as manufactured by Pan America Environmental. The media material of construction shall be compatibility matched to product being separated. The Flopak media shall be encased in 304 stainless steel frames with lifting lugs and removable lids to allow ease of moving media packs and disassembly/assembly. The influent end media frame(s) shall have permanently attached guide clips to attach frame(s) to wall mounted bypass prevention brackets. Each frame will be attached to its closest neighboring frame on both ends and/or sides of the frame via stainless steel attaching plates and stainless hardware. This arrangement will stop any movement or shifting of media frames once installed. The influent end media frame(s) shall be provided with a stainless steel, vertical bypass prevention plate located on top of frame on the influent end of the frame to prevent flow bypass above the frame if water flow should exceed top of media frames.

Two influent bypass prevention brackets will be supplied to attach media frames to tank and prevent bypass of the flow between the side of the media frames and tank wall. These brackets must extend from the bottom of the media frames to

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above the water line. If the tank has a v-hopper or pyramid type hoppers for solids collection a media bottom support/flow bypass prevention baffle shall be provided extending from the bottom of the influent media frame to near the bottom of the v-hopper without interfering with the auger and solids movement. This baffle shall be attached and sealed to the v-hopper walls.

2.05 Manufacturer

The manufacturer of preference shall be: Pan America Environmental 2385 Hammond Dr. Ste 3 Schaumburg, IL 60173 - 847/882.5855 - Fax: 847/882.5630

2.06 Warranty

Pan America Environmental warrants its products to be free of defect in materials and workmanship for a period of one year from the date of shipment.

Note: concrete separator project criteria vary and as such, Pan America Environmental requires full review and quotation to determine all components required for your project. This specification is a general reference designed to suggest and guide the engineer in determining proper system design.

COS Series Concrete Oil/Water Separator Engineering Specification (Pre-Fabricated tank)

COS-2 through COS-200

SECTION 1.0 OIL/WATER SEPARATOR

Performance

The Pan America Environmental COS Series Oil/Water Separators are designed to produce an effluent concentration of 10 mg/l or less of oil droplets 30 micron and larger of non-emulsified, free and dispersed oils. By virtue of our Flopak coalescing media and tank designs readily settleable solids are also removed.

1.01 Design and Engineering

The oil/water separator will be designed and fabricated per the following specifications. Rectangular tankage with features as described designed per API #421 Design & Operation of Oil/Water Separators Manual and Stokes law.

1.01.1 Pan America Environmental (PAE) will provide internal tank dimensioning, design and internal component location/installation drawings for use in customer installation and assembly. Component installation hardware shall be specified. Pre-fabricated tanks are to be reviewed for applicability to the project. Pre-fab tank sizes and designs are limited. The project must be reviewed to assure the correct tank is available in the local market.

1.01.2 Pre-fabricated tank specification.

Tank shall conform to the following minimum construction standards or as dictated by engineering:

- Concrete strength: 4500 psi @ 28 days, Density = 150pcf.
- Cement: Portland Type VII per ASTM C 150-92
- Admixtures & plasticizers per ASTM C 260-86 & C 494-92
- Reinforcing per ASTM A185. Min. 1 ½" cover.
- Top slab sealed with butyl rope mastic
- 4-8" wall, base & top thickness
- Tank dimensions to be determined
- 1-2) 36" X 48" access ways with plug covers to be provided or as required by media frame sizes.

1.02 Influent Chamber

Influent flow enters the clog proof influent diffuser pipe and is immediately spread out across the depth and width of the chamber. Any readily settleable solids drop to the bottom of the separation chamber.

1.03 Oil/Water Separation Chamber

The separation chamber is to be packed with PVC, Flopak cross-fluted coalescing media. The media pack will be designed to create a quiescent zone, a laminar flow pattern to facilitate the impingement of oil on the media, and will provide numerous droplet impact sites and changes of flow direction. The media shall have a 60-degree cross-flute angle.

1.04 Oil Retention Baffle and Oil Skimmer

A steel or concrete oil retention baffle shall be provided to retain all separated oils within the separation chamber. The baffle shall stretch from one sidewall to the opposite wall and shall be provided with sufficient height to stop any bypass of water or oils over the top and around sides during normal operation. An oil skimming weir and integral reservoir are located, attached to this baffle. The steel baffle shall be prepared to an SSPC-SP10 surface preparation and coated with a coal tar epoxy coating (14 dft). The baffle shall be provided with a horizontal flange and lifting lugs located at the top edge of the baffle. Two vertical flanges will be provided along both side edges of baffle with mounting bolt slots to allow bolted attachment to the concrete tank walls. The baffle shall be designed to support its own weight and the weight of any peripheral assemblies/equipment attached to it. 304/316 stainless construction can be provided in place of coated steel if desired.

1.08 Effluent Weir

The effluent end of the tank will be provided with a concrete or coated, carbon steel water weir baffle with attached, 304 stainless steel, adjustable water weir plate.

1.09 Inlet/Outlet

Schedule 40 PVC or SDR35 PVC, steel or cast iron inlet/outlet piping is provided by customer or contractor.

Section 2.0 Materials of Construction

2.01 Concrete Construction

As detailed in 1.01.2. Customer is to review concrete design specifications to verify design meets their project requirements.

2.02 Steel Component Surface Preparation and Coating

Internal, carbon steel component surfaces shall be prepared to an SSPC-SP10 near white metal blast. All wetted surfaces of steel components, coating shall be self-priming, coal tar epoxy (14 dft). 304/316 stainless steel construction can be substituted for coated carbon steel components if desired or required.

2.03 Piping

Internal/through wall piping shall be A-53 steel; iron, stainless steel, polyethylene or PVC as required or desired.

2.04 Coalescing Media

Cross-fluted, PVC, oleophilic, Flopak coalescing media shall be provided as manufactured by Pan America Environmental. The media material of construction shall be compatibility matched to product being separated. The Flopak media shall be encased in a 304 stainless steel frame with lifting lugs and removable lids to allow ease of moving media packs and disassembly/assembly. The influent end media frame shall have permanently attached guide clips to attach frame to wall mounted bypass prevention brackets.

Two (2) influent bypass prevention wall brackets will be supplied to attach media frames to tank and prevent bypass of the flow between the side of the media frames and tank wall. These brackets must extend from the bottom of the media frames to above the water line.

2.05 Manufacturer

The manufacturer of preference shall be:

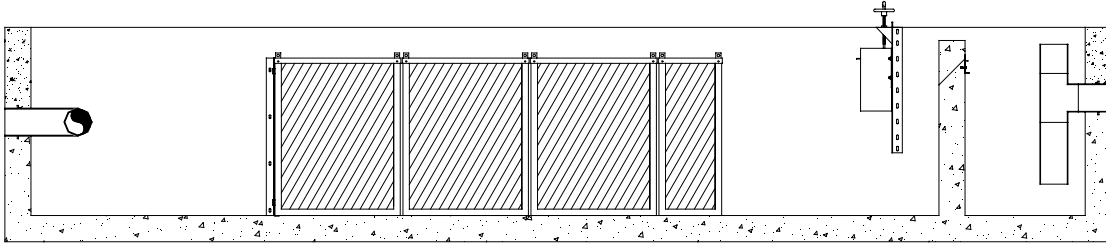
Pan America Environmental 2385 Hammond Dr. Ste 3 Schaumburg, IL 60173 - 847/882.5855 - Fax: 847/882.5630

2.06 Warranty

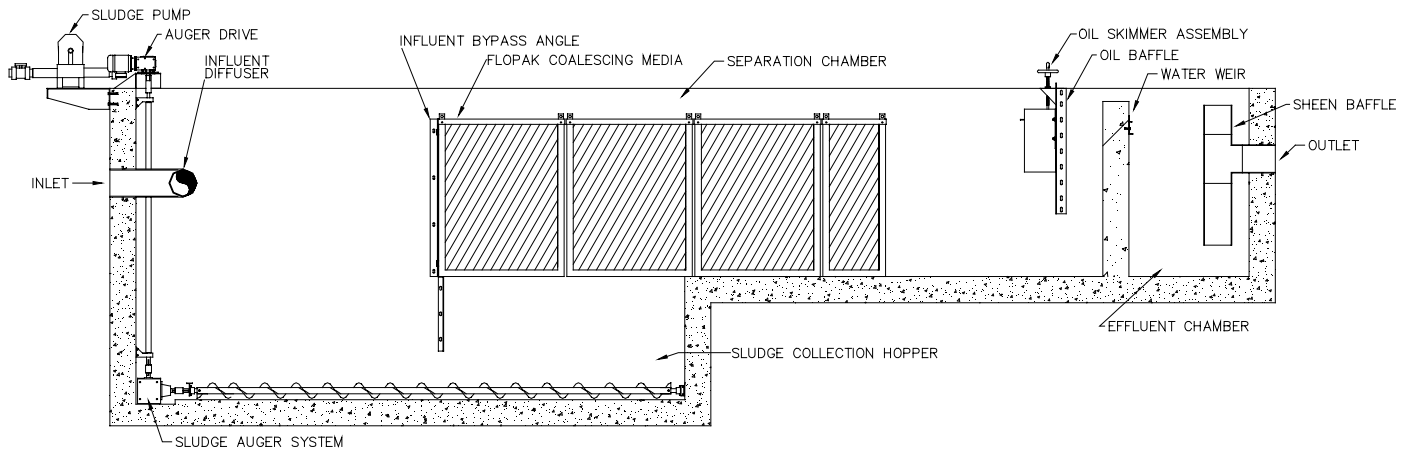
Pan America Environmental warrants its products to be free of defect in materials and workmanship for a period of one year from the date of shipment.

Note: concrete separator project criteria vary and as such, Pan America Environmental requires full review and quotation to determine all components required for your project. This specification is a general reference designed to suggest and guide the engineer in determining proper system design. Due to limitation in vault sizes and local availability, pre-fabricated concrete vaults can only be applied to low to medium flow rates.

COS Tank Detail



FLAT BOTTOM DESIGN



V-HOPPER DESIGN