Oil Water Separators – General Specifications

PART 1 - REFERENCES
The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by basic designation only.

1.1 American Petroleum Institute (API)
API Publication 421, "Monographs on Refinery Environment Control - Management of Water Discharges, Design and Operation of Oil-Water Separators".

1.2 American Welding Society (AWS) Standards
D1.1-92 Structural Welding Code-Steel.

1.3 American Society for Testing and Materials
(ASTM) Standards:
A36-93 Structural Steel

1.4 American National Standards Institute (ANSI) Standards:
ANSI B16.5-88 Pipe Flanges and Flanged Fittings

1.5 EPA Methods for Chemical Analysis of Water & Wastewater
16th Edition (1985) - Section 503A

1.6 Steel Structures Painting Council (SSPC) Standards:
SSPC-SP10 Near-White Blast Cleaning

1.7 National Association of Corrosion Engineers
(NACE) Standards:
Standards for Interior and Exterior Surfaces

PART 2 - GENERAL
2.1 Application
The oil/water separator shall be a prefabricated rectangular unit of the parallel corrugated plate gravity displacement type as specified herein and as described in API Publication
421. The oil/water separator shall be designed for gravity separation of nonemulsified oil from the waste water stream only along with some settleable solids. The source of the influent to the separator shall be *[gravity, pumped]* flow from *[describe the application or process]*.
2.2 Performance
The separator shall remove essentially all free and dispersed non-emulsified oil from the water stream and produce an effluent containing less than __ mg/l of oil droplets larger than __ microns.

2.3 Influent Characteristics:
Provide oil/water separator designed for a maximum average flow of ___ gallons per minute (gpm). The influent is further characterized as follows:
Operating Temperature ___ °F
Specific Gravity of Oil ___
Specific Gravity of Water ___
Specific Gravity of Solids ___

2.4 Design Criteria
The oil/water separator shall be designed in accordance with Stokes Law and API Bulletin No. 421.

2.5 Inspection and Quality Assurance
The oil/water separator shall be fabricated, inspected and tested for leakage before shipment from the factory as a completely assembled system ready for installation.

2.6 Submittals
Shop drawings for separators shall be submitted and shall show principal dimensions and locations of all fittings. Design calculations shall be provided and shall reflect that oil/water separator is in conformance with effluent requirements when operating under detailed influent conditions. These calculations should show oil rise rate, overflow rate, Reynolds Number and removal efficiency. Shop drawings shall include brochures, catalog cuts, operations and maintenance instructions, dimensions, and location of accessories.

2.6.1 Design Data
Submit analysis *[, signed by a registered ProfessionalEngineer,]* which indicates that at the calculated overflow rate, the separator will be provided with the required square feet of projected plate separation area to achieve the specified performance under laminar flow (i.e. Reynolds number of less than 500) conditions. Calculations shall take into account the rate of flow, potential surge flow influent concentrations, particle characteristics, fluid temperature, fluid specific gravities, and pH.

PART 3 - CONSTRUCTION

3.1 Fabrication
Provide a special purpose prefabricated parallel corrugated plate rectangular gravity displacementtype oil/water separator. Separator shall be comprised of a tank containing an inlet compartment, separation chamber, oil storage chamber, sludge chamber and clean water outlet chamber.

3.2 Tank
The tank shall be constructed of ___" minimum thick carbon steel pate conforming to ASTM A36. Weld in accordance with AWS D1.1 to provide a watertight tank that will not warp or deform under load. Pipe connections to the exterior shall be as follows:

3.2.1 Separator Corrosion Protection
After shop conducted hydrostatic tests have been successfully completed, provide a coating system to the interior and exterior surfaces of the separator. Interior and exterior sandblasted to SSPC-SP10; interior lined with Tnemec series 61 liner to 9 mils MDFT; Exterior coated with Polyamide epoxy to 5 mils MDFT.

3.3 Flanges
Use only flat face flanges and drill 150 pound ANSI standard bolt circle. Use flanged piping connections that conform to ANSI B16.5.

3.4 Lifting Lugs
The tank shall be provided with properly sized lifting lugs for handling and installation.

3.5 Covers
Provide tank covers with a vapor tight seal for vapor control . Include gas vents and suitable hinged access man ways to each separator compartment.
These covers shall be constructed of the same material as the tank and shall be fastened in place. A gasket shall be provided for vapor tightness.

3.6 Identification Plates
Identification plate should identify manufacturer, describe procedures for operating and servicing the equipment, and include warning of any hazardous conditions. Plates shall be durable and legible throughout the life of the equipment.

3.7 Inlet Compartment
The inlet chamber shall be comprised of a non-clog diffuser pipe to distribute the flow across the width of the separation chamber. The inlet compartment shall be of sufficient volume to effectively reduce influent suspended solids, dissipate energy and begin separation. A sludge baffle will be provided to retain settleable solids and sediment from entering the separation chamber.

3.8 Separation Chamber
Provide an oil separator chamber containing parallel plates. Parallel plates shall be at an angle from 40 to 60 degrees with respect to longitudinal axis of the plate corrugations and spaced not less than 1/4 inch and not more than 1-1/8 inch apart for removal of free oil and settleable solids. Configuration used shall not promote solids buildup on plates, which would increase velocities to point of discharging an effluent of unacceptable quality. Maintain laminar flow (i.e. Reynolds number of less than 500) at maximum design flow rate throughout plate packs including entrance and exit so as to prevent re-entrainment of oil(s) with water. Flow through plate packs shall be in a downflow mode parallel to plate corrugations or crossflow perpendicular to plate corrugations so that the oil collects and coalesces at high point of corrugations and rises to top of pack without clogging from oil or settleable solids.

3.9 Baffles
Provide oil retention baffle, *[adjustable]* water Over flow weir, and stationary underflow weir. Position underflow weir to prevent resuspension of settled solids. Baffle to ASTM A36 carbon steel plate of same thickness as tank.

3.10 Sludge Chamber *[optional]*
The sludge chamber shall be located under the separation chamber and shall provide an adequate volume for the settling of any solids. The angle of repose of the sludge chamber shall be 45° to ensure complete removal of the solids. The sludge chamber shall also prevent any solids from entering the clean water chamber.

3.11 Integral Oil Storage Compartment
[optional] An oil storage compartment shall be provided for storing separated oil. The compartment shall be adjacent to the coalescing compartment and shall be constructed of ASTM A36 carbon steel plate of same thickness as tank.

3.12 Oil Reservoir
The oil reservoir at the end of the separation chamber shall have a *[fixed ASTM A36 steel weir, rotatable PVC skimmer]* for automatic decant of the separated oil and is equipped with gravity outlet fitting*[s on either side of the separator]*.

3.13 Clean Water Chamber
Provide clean water chamber which allows the water to leave the separator by gravity flow through the clean water outlet port.

3.14 Vents
Sufficient vents shall be provided.

3.15 Sampling Ports
Sample ports shall permit easy access for obtaining isokinetic samples. Sample ports shall consist of a short length of ¼" diameter tubing, ¼" ball valve, and another short length of ¼" diameter tubing on the outlet of the ball valve.

PART 4 - ACCESSORIES AND OPTIONS

4.1 Oil/Water Separator Accessories
The manufacturer shall provide the following accessories as part of the oil water separator.

4.1.1 Removable Polypropylene Coalescer *[optional]*
The manufacturer shall provide a removable polypropylene coalescer designed to intercept oil globules of less than 20 micron in diameter to an effluent quality of 10 mg/l free petroleum hydrocarbon.

4.1.2 Ladder and Platform *[optional]*
The manufacturer shall provide OSHA compliant platform and ladder for easy access to all separator compartments.

PART 5 - WARRANTY

5.1 Oil/water separator tank and accessories
The oil/water separator tank and all accessories shall be provided with a one (1) year warranty for defective equipment.

5.2 Oil water separator accessories
All accessories and treatment equipment supplied as part of the oil/water separator system shall contain a one (1) year warranty for defective equipment.

PART 6 - EXECUTION

6.1 Delivery and Storage
Inspect materials delivered to site for damage; unload and store with minimum handling. Store materials on site in enclosures or under protective coatings. Adequately protect materials not suitable for outdoor storage to prevent damage during periods of inclement weather, including subfreezing temperatures, precipitation, and high winds. Store all materials susceptible to deterioration by direct sunlight under cover and avoid damage due to high temperatures. Do not store materials directly on the ground. If special precautions are required, prominently and legibly stencil instructions for such precautions on outside of equipment or its crating.

6.2 Handling
Handling and placing of coated steel tanks shall be done with care and in a manner that will minimize damage to the coating and will not reduce the protective effectiveness of the coating. Carry and do not drag materials. The coated tanks shall be placed carefully in position with a minimum of handling. All damaged surfaces which occur during these operations shall be repaired by and at the expense of the Contractor.

6.3 Installation
Oil separators shall be installed as shown on the drawings and in strict accordance with the manufacturer's recommendations.

PART 7 - QUALITY ASSURANCE PROVISIONS

7.1 Inspection
Examine each component of separator for compliance with requirements specified in PART 3 - CONSTRUCTION. This element of inspection shall encompass visual examinations and dimensional measurements. Noncompliance with specified requirements, or presence of one or more defects preventing or lessening maximum efficiency of separator operations, shall constitute cause for rejection.

7.2 Pretest Procedures
After separator has been leveled, hydrostatically test unit for four (4) hours by filling full with potable water, provided by Customer, with means of getting it from the nearest source by the Contractor. Acceptance criteria for this test is no leakage after four (4) hours.

7.3 Tests
After the hydrostatic test has been successfully completed and unit has been properly connected to influent and effluent piping, allow influent oil/water mixture of ____ ppm, as previously described in paragraph 2.3 INFLUENT CHARACTERISTICS, to flow into separator filled with potable water. After injection, operate unit for a minimum of ten tank volume changes prior to testing for contaminant removal.

7.4 Tests for Contaminants
The Contractor shall test the effluent to ensure that it meets oil concentration levels described in paragraph 2.3 INFLUENTCHARACTERISTICS. Test shall be performed by an independent certified testing laboratory.

7.5 Analytical Methods
Test and sample preservation methods for test contaminants shall be in accordance with the latest revision of EPA Methods for Chemical Analysis of Water and Wastes. Effluent oil concentration shall be measured by the Gravimetric, Separatory Funnel Extraction method.

7.6 Test Acceptance or Rejection Criteria
Oil separators shall meet-performance characteristics related in influent characteristics as stated. Testing reports or Manufacturer's Certificate of Performance Compliance shall be submitted. If testing indicates that the system does not meet design requirements all corrective measures shall be taken as necessary to achieve design requirements.