

# RECOMMENDED SPECIFICATIONS FOR AREO-POWER 10 PPM OIL WATER SEPARATORS WITH "THROUGH SHELL" CONNECTIONS

## 1. APPLICABLE PUBLICATIONS

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

### 1.1 American Petroleum Institute (A.P.I.)

A.P.I. Publication 421, Monographs on Refinery Environmental Control - Management of Water Discharges, Design and Operation of Oil/Water Separators".

### 1.2 American Society for Testing and Materials (A.S.T.M.) Standards

A 36-93 Structural Steel

### 1.3 Steel Structures Painting Council (S.S.P.C.) Standard

S.S.P.C.-SP-10 Near White Blast Cleaning

### 1.4 American Welding Society (A.W.S.) Standards

D1.1-86 Structural Welding Code-Steel

### 1.5 American National Standards Institute (A.N.S.I.) Standards

A.N.S.I. b16.5-88 Pipe Flanges and Flanged Fittings

### 1.6 Underwriters Laboratories, Inc. (U/L) Publications

U.L. -58 Standards for Steel Underground Tanks for Flammable and Combustible Liquids.

U.L. -1746 Corrosion Protection of Underground Tanks

### 1.7 Steel Tank Institute (STI) Standards

sti-P3® or ACT-100-U® Corrosion Control System

### 1.8 Steel Tank Institute (STI) Standards

RP-02-855-95 Control of External Corrosion on Metallic buried, Partially Buried, or Submerged Liquid Storage Systems.

### 1.9 Steel Tank Institute (STI) Standards

Standard Methods for the Examination of Water and Wastewater, 16<sup>th</sup> Edition (1985); Section 503A.

## **2. GENERAL**

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Provide and install Areo Powers 4000 gal Parallel Corrugated Plate Gravity Displacement Oil/Water Separator with capacity and dimensions indicated in. Separator(s) shall be 64" in diameter and 24' long.

### **2.1 Application**

Oil/Water Separators shall be standard prefabricated cylindrical units of the parallel corrugated plate, gravity displacement type as specified herein and as described in A.P.I. Publication 421. Oil/Water Separator shall be designed for gravity separation of non emulsified oil and other petroleum products from the waste water stream, along with some settleable solids. The source of the influent to the separator shall be gravity flow from stormwater runoff, hydrocarbon spills, and/or cleaning/maintenance operations.

### **2.2 Description**

Parallel/Corrugated plate separator shall be a manufacturer standard unit and be completely shop fabricated, inspected and tested for leakage before shipment from the factory as a completely assembled vessel ready for installation.

Separator shall be designed for earth, live load, and hydrostatic pressures as dictated by site conditions on the drawings.

Each separator unit shall consist of inlet and outlet connections through the tank shell, non-clogging flow distributor and energy dissipater device, stationary under flow baffle, presettling chamber for solids, sludge baffle, oil coalescing chamber with parallel corrugated plates to optimize separation of free oil from liquid carrier, effluent downcomer positioned to prevent discharge of free oil that has been separated from the carrier liquid, access manways or hatches for each chamber, fittings for vent, oil pump-out, sampling, gauging, and lifting lugs. Flow through the unit shall be by gravity with maximum head loss through the unit of one foot, meeting invert elevations as dictated by contract drawings.

### **2.3 Influent Characteristics**

Provide oil/water separator designed for maximum average flow rate of 400 gallons per minute (gpm) the influent is further characterized as follows:

Temperature	_____degrees F
Concentration	_____ppm
Oil Specific Gravity	_____@ 40 degrees F
Water Specific Gravity	_____@ 40 degrees F
Solids Specific Gravity	_____@ 40 degrees F

Occasional spills of 100 percent for several minutes must be processed without appreciable effect on the quality of the effluent.

### **2.4 Performance**

The separator shall remove essentially all free and dispersed non-emulsified oil from the wastewater stream and produce an effluent containing less than 10 mg/l of oil droplets larger than 20 microns.

## **2.5 Design Criteria**

The oil/water separator shall be designed in accordance with Stokes Law and API Bulletin 421.

## **3. CONSTRUCTION**

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### **3.1 Fabrication**

Oil Separator shall be standard prefabricated parallel corrugated plate gravity displacement type unit.

The separator shall be cylindrical and capacities, dimensions, construction, and thickness shall be in strict accordance with Underwriters Laboratories, Subject U.L.-58 Standard for Safety, Steel Underground Tanks for Flammable and Combustible Liquids. Use minimum 3/16 inch minimum thick carbon steel plate conforming to A.S.T.M. A 36. Weld in accordance with A.W.S. D1.1 to provide a watertight tank that will not warp or deform excessively under load. Use qualified welders in accordance with A.W.S. , Standard Qualification Publication. Grind all welds smooth and remove weld splatter. Fabricate neatly and accurately free of kinks and sharp bends in a manner not to reduce the strength of the steel to a value less than that intended by design. Size and shape of bends shall be uniform. Use only flat face flanges and drill 150 pound A.N.S.I. Standard bolt circle, removing all burrs. Use flanged piping connections that conform to A.N.S.I. B-16-5, welding neck type.

The separator shall be a pre-packaged, pre-engineered, ready to install unit consisting of:

**3.2** An influent connection 8 inch, flanged.

**3.3** An internal influent nozzle at the inlet end of the separator, located at the furthest diagonal point from the effluent discharge opening.

**3.4** A Laminer Flow Inducer at the inlet to:

3.4.1. reduce horizontal velocity and flow turbulence.

3.4.2. distribute the flow equally over the separators cross sectional area.

3.4.3. direct the flow in the serpentine path in order to enhance hydraulic characteristics and fully utilize all separator volume.

3.4.4. completely isolate all inlet turbulence from the separation chamber.

**3.5** A sediment chamber to disperse flow and collect oily solids and sediments. Sediment chamber shall be of sufficient volume to effectively reduce influent suspended solids, dissipate energy, and begin separation.

**3.6** A sludge baffle to retain settleable solids and sediment and prevent them from entering the separation chamber.

**3.7** An Oil/Water Separation Chamber containing a parallel corrugated plate and impingement coalescer.

Parallel corrugated plates shall be at an angle from 40 to 60 degrees with respect to the

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 solids buildup on plates. Flow through plate packs shall be in a downflow mode parallel to plate corrugations or crossflow perpendicular to plate corrugations so that oil collects and coalesces at the high points of corrugations and rises to the top of the plate pack without clogging from oil or settleable solids.

Removable polypropylene impingement coalescer shall be designed to intercept oil globules of less than 20 microns in diameter to produce an effluent quality of less than 10 ppm free oil.

### **3.8 Waste Oil Storage**

The waste oil storage shall be an integral part of the separator, and have a capacity of 40 percent of the total separator's volume.

### **3.9 Waste Oil Storage Level Alarm**

Separator shall be furnished with intrinsically safe oil level controls to activate high level alarm at a predetermined oil level to notify personnel when oil water separator requires pump out. The annunciation must be audible and visual. All components enclosed in common NEMA 3R enclosure.

**3.10** An internal effluent downcomer at the outlet end of the separator, to allow for discharge from the bottom of the separation chamber only.

**3.11** An effluent connection 8 inch, flanged.

**3.12** Fittings for vent, interface/level sensor, and waste oil pump-out, sampling, and gauge.

**3.13** Two 24" diameter manholes, U.L. approved, complete with extension, cover, gasket, and bolts. One manway shall be placed between the inlet and the parallel corrugated plate coalescer to facilitate access into sediment chamber for solids removal. One manway shall be placed between the parallel corrugated plate coalescer and outlet to facilitate access into the oil water separation chamber for oil removal.

**3.14** Provide adequate extensions to finish grade for all manholes and access points as shown on the plans. Manholes and extensions shall be provided with a heavy duty cast gray or cast ductile iron frame and cover and placed in a concrete pad.

**3.15** Vents - The separator shall be furnished with vents per A.P.I. standard.

**3.16** Lifting lugs at balancing points for handling and installation.

**3.17** Bolts, stiffeners, washers, nuts, screws, pins, and fittings as required shall be corrosion resistant (a corrosion resistant material is defined as a material that is inherently corrosion resistant and not merely corrosion resistant coated, such as provided by the galvanizing process).

**3.18** Identification plates - Plates to be affixed in prominent location and be durable and legible throughout equipment life.

**3.19** The separator shall be set level on a reinforced concrete pad with steel hold-down straps with dielectric liners to hold the tank securely in place as recommended by the manufacturer.

### **3.20 Corrosion Control System**

Provide underground corrosion control system consisting of coating supplemented with cathodic protection per N.A.C.E. Standard RP-02-85-95 and in strict accordance with either sti-P3® or ACT-100-U® label.

The sti-P3® Corrosion Protection System shall include:

1. Corrocote Plus Polyurethane Corrosion Resistant Coating over SPCC-SP6 grit blast.
2. Preengineered Cathodic Protection System with Monitor.
3. Electrical Isolation.
4. 30-year Limited Warranty

or

The ACT-100U® Corrosion Protection System shall include:

1. External surfaces commercial blast, coated 70 mils DFT Fiberthane Polymer coating (ACT-100U®) over SPCC-SP6 grit blast.
2. Electrical Isolation.
3. 30-year Limited Warranty

Additionally, all interior surfaces shall be grit blast to SPCC-SP6 and coated with Corrocote II Ultraliner.

## **4. EXECUTION**

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### **4.1 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.

### **4.2 Handling and Placing**

Handling and placing of coated steel tanks shall be done with care and in a manner that will minimize damage of 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.

### **4.3 Installation**

Oil Separators shall be installed in locations shown on the drawings and in strict

accordance with the manufacturer's recommendations. For all underground tanks, back-fill shall not be started until the in-place tank has been inspected and certified by the Contracting Officer to be ready for backfilling.

## **5. QUALITY ASSURANCE PROVISIONS**

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### **5.1 Inspection**

Examine each component of separator for compliance with requirements specified 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 operation, shall constitute cause for rejection.

### **5.2 Pretest procedure**

After separator has been leveled, hydrostatically rest unit for 4 hours by filling with potable water prior to backfilling. Acceptance criteria for this test is no leakage for 4 hours.

### **5.3 Tests**

After the hydrostatic test has been successfully completed and unit has been properly connected to influent and effluent piping, allow influent oil-in-water mixture of 300 ppm as previously described in paragraph: Performance to flow into separator filled with potable water. After injection, operate unit for repeated volume changes prior to testing for containment removal.

### **5.4 Tests and Contaminants**

The contractor shall test the effluent to ensure that it meets oil concentration levels described in paragraph PERFORMANCE. Test shall be performed by an independent certified testing laboratory.

### **5.5 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 Soxhlet Extraction method.

### **5.6 Test Acceptance of Rejection Criteria**

Oil separators shall meet performance characteristics related to influent characteristics as stated. Testing reports or Manufacturer's Certificate of Performance Compliance shall be submitted to the Contracting Officer. If testing indicates that the system does not meet design requirements all corrective measures shall be taken as necessary to achieve design requirements at no additional cost to the Government.

## **6. SUBMITTALS**

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### **6.1 Shop Drawings**

Shop drawings for separator shall be submitted in accordance with the CONTRACT

CLAUSES and shall show principle dimensions and locations of all fittings. Design calculations shall reflect that oil/water separator is in conformance with effluent requirements when operating under detailed influent conditions. These should show calculation for rise rate, specific gravity, water temperature, droplet size removal rate, and removal efficiency. Shop drawings shall include brochures, catalog cuts, structural calculations, dimensions, and location of accessories.

## **6.2 Reports and Certificates**

Submit a complete signed report of results of inspection, operation, adjustments and tests. Report shall include detailed descriptions of points inspected, tests and adjustments made, and quantitative results obtained. Include a Manufacturer Certificate of Compliance that equipment conforms to specified requirements and is ready for permanent operation.

## **6.3 Pre-operational Test Report**

Pre-operational test report shall be submitted by the Contractor. Report shall document all inspections, operations, and tests performed and shall indicate whether they were acceptable or not. For unacceptable items, describe corrective action taken or recommended.

## **6.4 Verification**

Written verification the surface preparation and coating application were performed in accordance with the coating system, manufacturer's printed recommendations in the case of manufactured unit.

## **6.5 Effluent Contaminant Tests**

Test results of effluent contaminant tests.

## **6.6 Operation and Maintenance Instructions**

Provide three complete sets of installation, operation, and maintenance instructions for manufactured separator that contain clear and concise descriptions of installation, operation, and maintenance procedures and list of parts for the equipment with catalog numbers and other data necessary for ordering replacement parts.

## **7.0 APPROVED MANUFACTURERS**

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The Oil/water separator shall be manufactured by Areo-Power Unitized Fueler, 103 Smithtown Blvd., Smithtown, NY 11787, Phone: (800) 242-2736, Fax: (516) 366-0905.

### **Accessories and Options**

- Oil/Water separator with capacities, dimensions, construction, and thickness in strict accordance with Underwriters Laboratories, Subject UL-58 Standard for Safety, Steel Underground Tanks for Flammable and Combustible Liquids, Type I Double Wall construction with 360 degree Secondary Containment Wall.

\*Note: The UL No.58 - type I constructed tank shall have a double shell with a space between the layers. The inner primary containment tank (including pipe

connections, manholes, etc.) shall be constructed in strict conformance with UL-58. Construction of the outer secondary containment wrap shall be separate from the inner primary containment tank, but in direct contact with the primary tank; where, the inner tank is completely contained within the outer wrap, it. the outer wrap covers 360 degrees (100% of the tank volume). this space between the inner and outer walls shall be monitored with an approved electronic leak detection device through a pipe which extends vertically to the top of the tank from a small sump at the bottom.

- An audible and visual leak detection alarm system which indicates hydrocarbon and/or water in the interstice, and can differentiate between either shall be provided. The control panel shall contain both the oil level sensor and leak detection controls with all components enclosed in common NEMA 3R enclosure.]
- Steel hold down straps with turnbuckles and di-electric liners.

**Consult Areo-Power for:**

- Special coatings (Interior or Exterior)
- Integral Oil or Effluent Compartments
- Level Controls and Automatic Pumpout Systems
- Heating Systems, Electric or Steam
- Storage Tanks and Accessories

End of Section