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NAVFAC **IGS-11311 (December 2002)**

Preparing Activity: LANTNAVFACENGCOM **Based on UFGS-11311**

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

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SECTION 11311

PARALLEL PLATE [OR VERTICAL TUBE], GRAVITY OIL-WATER SEPARATOR

12/02

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NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

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NOTE: This guide specification covers the requirements for parallel plate, and vertical tube gravity oil-water separators to remove free oil and particulate matter from oily waste water. The designer shall determine the allowable limits in the effluent by checking the requirements of the Final Governing Standards for Italy and the Station Environmental Office. If influent conditions dictate treatment beyond that provided by parallel plate separators, the designer shall prepare appropriate specifications to cover the additional treatment required.

When influent conditions require treatment beyond the capability of a parallel plate, vertical tube, or API type gravity separator (e.g. presence of a mechanical or chemical oil-water emulsion), the designer shall prepare specifications to add one or more of the following unit operations to the separation system to comply with discharge criteria:

Hydrocyclone
Chemical pretreatment unit
Flocculator
Dissolved air floatation unit
Electrocoagulation unit
Filter membranes
Cartridge filters
Activated carbon absorber
Multimedia filtration
Sludge dewatering equipment

In addition, these separators are not intended as containment devices. Where applicable regulations dictate containment of accidental spills, suitable containment systems shall be designed.

Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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NOTE: Designer shall coordinate project requirements with the DOD Environmental Final Governing Standards for Italy, dated 29 January, 2002 and subsequent updates and revisions. The DOD-FGS-Italy can be found at the LANTDIV website, http://www.lantdiv.navfac.navy.mil/, then follow tabs Business Lines/Environmental/Engineering Support/FGS Italy.

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NOTE: The following information shall be shown on the project drawings:

1. Inlet and outlet pipe invert elevations.

2. Sampling ports integral with the influent pipe and effluent pipe, when required.

3. Accessory equipment.

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PART 1 GENERAL

1.1 REFERENCES

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

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA MCAWW (1983)Chemical Analysis of Water and Wastes

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD-FGS-Italy	(1994) Environmental Final Governing Standards for Italy
MIL-P-24441	(Rev. B; Supp. 1) Paint, Epoxy-Polyamide

GERMAN INSTITUTE FOR STANDARDIZATION

DIN 1999	(2002)Seperator for Light Liquids

ITALIAN ELECTROTECHNICAL COMMITTEE STANDARDS (CEI)

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NOTE: A CEI Norm is an Italian technical normative for electrical systems recognized by Italian Law, submitted by a private organization "Comitato Electrotecnico Italiano" for the Italian territory, available in the Italian language and only in some cases in English.

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CEI 11-17	(1997) Generation, transmission and distribution systems of electric power
CEI 64-2	(1998) Electrical installations in locations with explosion hazard
CEI 64-8;V1;V2	(1998;01;01) Electrical installations of buildings

ITALIAN WELDING INSTITUTE (IIS)

IIS	(1997) Italian Welding Institute Publications and Manuals

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI)

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NOTE: A UNI Norm is a technical normative recognized as Italian Law, submitted by a private organization "Ente Nazionale Italiano di Unificazione" for Italy and is available only in the Italian language. It is the National Standard.

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UNI 2223	(1967) Metallic pipe flanges - Templates for drilling circular flanges
UNI 2240	(1967) Metallic pipe flanges - Cast steel flanges - Nominal pressure 16
UNI 7065	(1972) Cold rolled flat finished unalloyed steel products - Strips with carbon content between 0.10 and 0.60%

UNI 11001	(1962) Code of practice for edge preparation in fusion welding of steel structures

ITALIAN/EUROPEAN HARMONIZATION STANDARDS (UNI EN)(UNI ENV)(CEI EN) (UNI EN ISO)(UNI ISO)(pr.EN)

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NOTE: A UNI EN, UNI ENV, CEI EN, UNI EN ISO or UNI ISO is a European Standard with a coincident Italian National Standard or International Standard. The two standards are identical, with most (but not all) EN's available in the English language and the UNI available only in the Italian language.

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UNI EN 287-1/A1	(1993) Approval testing of welders - Fusion welding - Part 1: Steels
UNI EN 571-1	(1998) Non destructive testing - Penetrant testing - General principles
pr.EN 858-1	(2002)Systems of Seperation for Light Liquids
UNI EN ISO 8504-2	(2001) Preparation of steel substrates before application of paint and related products - Surface preparation methods - Abrasive blast cleaning

1.2 SYSTEM DESCRIPTION

1.2.1 Applications

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NOTE: Delete parts of paragraph which are not applicable for project with respect to liquid carrier. Identify oily wastewater source(s) such as machine and paint shops, aircraft maintenance operations, aircraft washrack and rinse (corrosion control) areas, tank farm and fuel transfer areas, runway and fire training areas, bilge and ballast water, accidental spills, and contaminated stormwater runoff.

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NOTE: Pumping of influent will mechanically emulsify oil in water unless a positive displacement pump or other low emulsifying, de-rated pump is used.

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NOTE: Identify site specific atmospheric conditions that would produce a corrosive environment for oil-water separator materials so that the proper protective coatings or corrosion resistant materials can be provided.

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NOTE: Designer should identify the European Waste Code or CER that will be encountered in the subsequent use of the oil-water separator and design the components accordingly in order that the completed separator will comply with the storage and disposal requirements of DOD-FGS-Italy.

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The separator shall remove free oil [and] [emulsified oil] [and suspended solids] from oil-in-water mixtures of [freshwater] [freshwater and seawater] [seawater] originating from [_____] operations. The influent oil-in-water mixture will [flow by gravity] [be pumped] to the unit which [will] [will not] be located in an area with a corrosive atmosphere. [The corrosive atmosphere is composed of [_____].] Wastewater that is collected in an oil-water separator is classified as special waste in the DOD-FGS-Italy. The design and operation of the oil-water separator shall comply with DOD-FGS-Italy requirements for containing and storage of the particular waste to be encountered, and with pr.EN 858-1 and DIN 1999.

1.2.2 Influent Characteristics

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NOTE: Insert maximum design flow and wastewater characteristics which have been established by direct measurement and chemical analysis.

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Provide oil-water separator designed for a maximum flow of [_____] liters per second. Operating temperatures of the influent oil-in-water mixture will range from [_____] to [_____] degrees C and ambient air temperatures will range from [_____] to [_____] degrees C. The specific [gravity] [gravities] of the [oil] [oils] at operating oil-water temperatures will range from [_____] to [_____] and the [total grease and oil] [petroleum hydrocarbon] concentration ranges from [_____] to [_____] [milligrams per liter (mg/L)] [percent by weight]. The specific gravity of the [freshwater] [freshwater and seawater] [seawater] at operating temperatures will range from [_____] to [_____]. The average specific gravity of the suspended solids is [_____]. The influent is further characterized as follows:

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NOTE: List additional types and concentrations of detergents, anti-oxidants, solvents, acids or bases, and heavy metals that may be present in the

oil-in-water mixture. If these additional items are present: chemical addition, flocculation and dissolved air flotation, or other appropriate unit operations may be needed for effective treatment of these constituents.

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Oil-in-Water Mixture	Minimum		Maximum
Total solids	[_____]	to	[_____] mg/L
Total suspended solids	[_____]	to	[_____] mg/L
[Total grease and oil	[_____]	to	[_____] mg/L]
[Petroleum hydrocarbons	[_____]	to	[_____] mg/L]
Detergent content	[_____]	to	[_____] ppm
pH	[_____]	to	[_____]
Oil droplet size distribution:			
Greater than 150 microns			[_____] percent
Greater than 100 microns			[_____] percent
Greater than 50 microns			[_____] percent
Greater than 20 microns			[_____] percent
[_____]			[_____] percent

1.2.3 Performance Requirements

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NOTE: Make choice based on standards or guidelines established by environmental regulatory agency(ies); or other design considerations, such as unit wastewater treatment process(es) that follow downstream from this separator. Quantity of free oil removed is dependent on characteristics of oil-in-water mixture. The practical minimum concentration achievable is 10 mg/L for a parallel plate separator under ideal conditions.

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NOTE: In general, free oil is defined as dispersed oil globules that rise to the surface of the water in which it is contained. The rate of rise of the oil particle is a function of its size and specific gravity as defined by Stoke's Law. Oil droplets

with diameters of greater than 20 microns and specific gravities of 0.95 or less are considered to constitute the free oil form. Smaller oil droplet diameters are attributed to mechanically or chemically emulsified oil.

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The [grease and oil] [petroleum hydrocarbon] concentration in the effluent from the oil-water separator shall not exceed the following limitations:

Contaminants	Maximum
[Total grease and oil, 30-day average	[_____] mg/L]
[Total grease and oil, daily maximum	[_____] mg/L]
[Petroleum hydrocarbon, 30-day average	[_____] mg/L]
[Petroleum hydrocarbon, daily maximum	[_____] mg/L]
[_____]	[_____]

To achieve [this goal] [these goals], it will be necessary to remove all free oil droplets equal to or greater than [_____] microns.

1.2.4 Electrical Requirements

All electrical devices installed in the oil separator pit shall be labeled Ex and shall be installed in accordance with CEI 64-2 for Class C1Z1.

1.3 DEFINITIONS

1.3.1 ASL

Local Sanitary Agency (ASL) is the local Italian agency responsible for oversight of environmental and public health regulations in the area where work site is located.

1.4 SUBMITTALS

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NOTE: Where a "G" in submittal tags follows a submittal item, it indicates Government approval for that item. Add "G" in submittal tags following any added or existing submittal items deemed sufficiently critical, complex, or aesthetically significant to merit approval by the Government. Submittal items not designated with a "G" will be approved by the QC organization.

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Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

Separator; G

[Accessory equipment; G]

Submit shop drawings for separator [and accessory equipment] including principal dimensions, location of fittings and unit foundation. Include data to verify center of gravity with the unit empty and filled with water.

SD-05 Design Data

Separator; G

[Accessory equipment; G]

Submit analysis, signed by a registered professional engineer, which indicates that at the calculated overflow rate, the separator will be provided with the required square meter 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.

SD-06 Test Reports

Shop hydrostatic test; G

Submit results of hydrostatic and dynamic testing.

Inspection

Field hydrostatic test

Preoperational test

In-service test

Electrical tests; G

SD-07 Certificates

Separator corrosion protection; G

Submit written verification on the fabricator's letterhead that surface preparation and coating application were performed in accordance with the manufacturer's printed recommendations for the coating system.

SD-08 Manufacturer's Instructions

Separator system; G

SD-10 Operation and Maintenance Data

Separator system; G, Data Package 3

[Accessory equipment; G, Data Package 3]

Submit operation and maintenance data in accordance with Section 01781, "Operation and Maintenance Data."

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 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 coverings. Protect materials not suitable for outdoor storage to prevent damage during periods of inclement weather, such as subfreezing temperatures, precipitation, and high winds. Store materials susceptible to deterioration by direct sunlight under cover and avoid damage due to high temperatures. Do not store materials directly on ground. If special precautions are required, prominently and legibly stencil instructions for such precautions on outside of equipment or its crating.

1.5.2 Handling

Handle separator in such a manner as to ensure delivery to final location in sound, undamaged condition. Take special care not to damage interior and exterior surfaces of separator, coalescing plates, [or tubes] and associated supports and pipe coatings or linings. Make satisfactory repairs to damaged materials at no cost to Government. Carry and do not drag materials.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Parallel Plate Gravity Oil/Water Separator

The following manufacturers provide parallel plate gravity and vertical tube type oil/water separator systems that generally comply with these specifications:

ecoTECHNIC GmbH
Horbach 4
A-4673 Gaspoltshofen
Tel: 43-7735-7320-0
Fax: 43-7735-7320-58
e-mail: support@ecotechnic.at
www.ecotechnic.at

GREENPIPE S.r.l.
Via Modena, 48/b

42015 Correggio (RE)
Tel: 0522-633123
Fax: 0522-633124
e-mail: info@greenpipe.it
www.greenpipe.it

PLASTEEL International, Inc.
Instal Rzeszow, S.A.
ul.M.Reja 12 35-211 Rzeszow, Poland
Tel: 48-17-8522-086
Fax: 48-17-8522-091
e-mail: marketing @instal.pl

2.2 MATERIALS

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NOTE: Insert reinforced concrete or other suitable material if carbon steel is not acceptable. On larger separators (e.g. flow rate greater than 3.16 L/s, 6 mm minimum thickness for carbon steel is recommended. Consult manufacturers' data.

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Use [4.76] [___] mm minimum thick carbon steel conforming to UNI 7065 [_____] or material having equivalent structural properties and corrosion resistance for tank, hoppers, stationary and adjustable weirs, nozzles, flow distributor and energy dissipator device, bolts, seals, stiffeners, washers, [tank cover] and nuts. Weld in accordance with UNI 11001 to provide watertight tank that will not warp or deform under load. Use welders qualified in accordance with UNI EN 287-1/A1 and IIS. Grind welds smooth and remove weld spatter. Fabricate free of kinks and sharp bends in a manner not to reduce the strength of steel to a value less than that intended by the design. Size and shape of bends shall be uniform. Clean and finish [carbon steel] [_____] surfaces as described in paragraph entitled "Separator Corrosion Protection."

2.2.1 Separator Corrosion Protection

2.2.1.1 Steel Separator

After shop conducted hydrostatic tests have been successfully completed, provide coating system to the interior and exterior surfaces of the separator. Prior to shop painting, abrasive blast clean the surfaces in accordance with UNI EN ISO 8504-2 to a surface profile of 0.025 to 0.0625 mm. [Provide manufacturers heavy duty coating system that will protect the separator from the oil-in-water mixture, [atmosphere,] and in-situ soil conditions specified herein.] [Apply primer conforming to MIL-P-24441/1, Formula 150 applied to a minimum dry film thickness of 0.075 to 0.10 mm. Apply intermediate coat conforming to MIL-P-24441/2, Formula 151 applied to a minimum dry film thickness of 0.075 to 0.10 mm. Apply topcoat conforming to MIL-P-24441/3, Formula 152 applied to a minimum dry film thickness of 0.075 to 0.10 mm. Total dry film thickness shall not be less than 0.23 mm.] Repair and replace areas of the coating system which are found to be damaged or defective upon delivery of equipment to the site or found to be

defective due to work of the applicator. An interior polytetrafluoroethylene liner with a minimum thickness of 3 mm may be provided in lieu of paint coating the interior tank surfaces.

2.2.1.2 Other Than Steel Separator

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NOTE: If other than steel is specified for the separator material, the designer shall specify an appropriate protective coating system for the separator material specified.
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After shop conducted hydrostatic tests and have been successfully completed, provide a coating system which will protect the separator from the oil-in-water mixture, [atmosphere,] and in situ soil conditions specified herein.

2.2.1.3 Cathodic Protection

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NOTE: Specify cathodic protection for metal separators in contact with soil. Design cathodic protection in accordance with the current edition of MIL-HDBK-1004/10, "Electrical Engineering Cathodic Protection" and edit the appropriate guide specification for inclusion in the project specification.
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For [below ground] [partially above and partially below ground] [above ground] metal separators, provide cathodic protection with test stations as specified in Section [13110, "Cathodic Protection by Galvanic Anodes"] [13111, "Cathodic Protection by Impressed Current"] in addition to the protective coating.

2.2.2 Substitutions

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NOTE: Designer shall check manufacturer's literature to assure construction material option selected is capable of withstanding anticipated forces and moments for the size of separator designed. Navy has experienced some problems with the fiberglass covered plywood and timber units when the fiberglass cracks; due to water seepage, wood has deteriorated causing structural failure.
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NOTE: Insert suitable material if carbon steel is not acceptable. Consult manufacturers' data.
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Separators constructed of [reinforced fiberglass] [reinforced glass fiber resin laminates over a rigid urethane foam core] [or] [reinforced glass fiber resin laminates over plywood and timber] may be provided in lieu of carbon steel [_____]. Provide fiberglass tanks with lifting straps. Glass fiber reinforced plastic weirs may be accepted as a suitable weir and baffle material provided that necessary requirements for anchorage of these items include provisions for contraction and expansion. Surfaces shall be seamless, chemically resistant to oil-in-water mixture, and resistant to ultraviolet deterioration. Preserve wood components prior to applying resin laminates to prevent deterioration.

2.2.3 External Surfaces

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NOTE: Include bracketed text as appropriate for below ground or partially below ground installations.
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External tank surfaces and appurtenances shall be resistant to corrosion from the in situ soil, [backfill material,] [groundwater,] [and surface runoff] [surface runoff and the surrounding atmosphere] [soil pH] [soil resistivity].

2.2.4 Internal Surfaces

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NOTE: The solvents in oil allow some plastic composite surfaces to absorb the oil. Once the plastic surfaces become saturated with oil they can become sticky. This is especially critical with plates since solids will tend not to slide down and eventually will clog the area between the parallel plates, resulting in increased maintenance.
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Parallel plate [or vertical tube] material and orientation shall enhance oil coalescence and solids removal, and be corrosion and chemically resistant to the oil-in-water mixture [and atmosphere] as specified in paragraph entitled "SYSTEM DESCRIPTION."

2.2.5 Hardware

Bolts, stiffeners, washers, nuts, screws, pins, and fittings as required shall be corrosion resistant [and resistant to seawater]. Provide materials that are inherently corrosion resistant and not merely treated with a corrosion-resistant coating, such as provided by the galvanizing process.

2.2.6 Accessibility

Parts subject to wear or requiring adjustment, inspection, cleaning or repair shall be accessible and capable of convenient removal when required.

2.3 TANK

Provide [above ground] [below ground] [partially above and partially below ground] tank to withstand hydraulic and soil loadings under static and dynamic conditions while empty and during operating conditions. Provide adequate support for additional loadings from tank appurtenances including weirs, hoppers, internal supports, parallel plate [or vertical tube] oil coalescers, equipment transportation, and rapid lowering and braking of load during handling operations. Bolt tank [and accessories] to weld-fabricated, structural steel skid base, or mount on manufacturer's standard base.

2.3.1 Lifting Mechanism

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NOTE: For units fabricated from fiberglass, specify straps. In a salt water environment substitute acceptable non-corroding metal such as but not limited to copper-nickel, stainless steel, or monel. Aluminum is unacceptable. Consult manufacturers' data.

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Fit tank with lifting [lugs] [straps] [padeyes] [supports] for handling and installation. Each [lug] [strap] [padeye] [support] shall carry the total dry weight of the tank and attendant appurtenances. Prominently display lifting instructions on [anodized aluminum] [_____] plate located on outside of tank.

2.3.2 Nozzles

Fit tank with nozzles specified.

Nozzle	Inside Diameter (mm)	No. Required
Influent	[_____]	[_____]
[Primary Solids Outlet	[_____]	[_____]]
[Primary Oil Outlet	[_____]	[_____]]
Secondary Solids Outlet	[_____]	[_____]
Secondary Oil Outlet	[_____]	[_____]
Effluent	[_____]	[_____]
Drain	[_____]	[_____]
Vents	[_____]	[_____]

2.3.3 Flanges

Use only flat face flanges and drill PN 16, UNI 2223 Standard bolt circle

and remove burrs. Use flanged piping connections that conform to UNI 2240, welding neck type.

2.3.4 Weirs

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NOTE: Insert suitable material if carbon steel is not acceptable. Consult manufacturers' data.
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NOTE: Angle of slope of hopper bottom shall be greater than the angle of repose of the stored material. Volume and angle of repose for solids collected to be determined by designer based on oil-in-water mixture characteristics and frequency of cleaning.
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Attach stationary weirs and adjustable weir supports to tank side walls to provide a watertight seal between adjoining compartments and trough to prevent hydraulic short-circuiting. Use carbon steel [_____] for weir plates and baffles. Provide sharp crested weirs of size and section specified by manufacture. Provide slotted holes in weir plates and baffles or supports to permit horizontal and vertical adjustment of weir or baffle. Use nondeteriorating sealant or gaskets for mounting weir plates. Fill voids between tank wall and weir plate with sealant to make watertight. If required, [primary and secondary hoppers] [the secondary hopper] shall have [volumes] [a volume] of [_____] [and [_____]] cubic meter. Slopes of hopper bottoms shall be [_____] radians. Match top of [hopper] [hoppers] to bottom of tank and span entire tank width. Locate settleable solids outlet [nozzle] [nozzles] at hopper low point and at longitudinal centerline of tank.

2.3.5 Low Point Drains

Provide means at low points for dewatering tank.

2.3.6 Identification Plates

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NOTE: In a salt water environment substitute acceptable non-corroding metal such as but not limited to copper-nickel, stainless steel, or monel. Aluminum is unacceptable. Nomenclature (or system identification) to be established by designer.
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Provide [anodized aluminum] [_____] identification and instruction plates and stamp necessary data. Securely affix plates, in prominent location, to tank with nonferrous screws or bolts of not less than 3 mm in diameter. Nomenclature shall be [_____].

2.3.7 Instruction Plates

Instruction plates shall describe special or required procedures to operate and service equipment, and shall include warnings of hazardous procedures and notice of safety and health requirements. Plates shall be durable and legible throughout equipment life.

2.3.8 Warning Sign

On entrances to the tank (and entrances to the vault) place a permanent sign which states the following: "DO NOT ENTER TANK (OR VAULT) OR PERFORM HOT WORK ON OR IN TANK UNTIL THE ATMOSPHERE HAS BEEN TESTED AND CERTIFIED GAS FREE AND SAFE." Provide signs in both English and Italian languages.

2.4 INLET COMPARTMENT

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NOTE: If total solids are less than 100 mg/L, these elements may be eliminated after adequate benchscale testing has been completed to support this conclusion. Designer shall indicate run of solids removal line from outlet nozzle to a point above grade.

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Provide inlet compartment of sufficient volume to effectively reduce influent [suspended] [settleable] solids and dissipate energy. Provide nonclogging flow distributor and energy dissipator device [and the primary solids collection hopper as specified in paragraph entitled "Reduction of Solids"]. Locate [adjustable, primary surface oil overflow weir and] sample ports as recommended by the manufacturer.

2.5 OIL COALESCING COMPARTMENT

2.5.1 Parallel Plates

Provide parallel plates at an angle from 0.70 to 1.05 rad with respect to longitudinal axis of the plate corrugations and space not less than 6 mm and not more than 19 mm 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 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 cross-flow 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.

[2.5.2 Vertical Tubes

If vertical tubes are provided, install tubes perpendicular to bottom of tank and align in a pattern to maintain laminar flow at maximum design flow rate through tube packs including entrance and exit to prevent emulsifying the oil(s) with water. Inlet to tube packs shall prevent hydraulic

short-circuiting of oil-in-water mixture across the top of the tubes.

]2.5.3 Supports

Brace and support individual plates [and tubes] or plate packs [and tube packs] to withstand loads associated with transportation and operation of units, including in place cleaning. Equip each plate [or tube] pack with lifting lugs or other attachments for handling and installation. Each lug shall carry total weight of plate pack [or tube pack]. Provide adequate structural supports to facilitate in place cleaning of plate pack [or tube] bundles.

2.5.4 Baffles

Provide oil retention baffle, adjustable surface oil overflow weir with trough, and stationary underflow baffle. Position underflow baffle to prevent resuspension of solids that have accumulated in secondary solids hopper.

2.6 OUTLET COMPARTMENT

Provide outlet compartment of [_____] cubic meter, an adjustable overflow effluent weir, a sampling port, and nozzles.

2.7 ACCESSORIES [AND ACCESSORY EQUIPMENT]

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NOTE: Specific project requirements may include one or more of the following accessories:

Access platforms
Access ladders (with minimum 1050 mm extensions above hatch opening with locking device)
Handrailing
Waste oil transfer pump
Oily waste transfer pump
Sludge transfer pump
Sludge or waste oil storage tanks
Immersion heaters
Tank windows
System monitoring and control instrumentation (e.g. oil content monitor, oil-water interface sensors, control panel, pressure gages, high level alarms, oil flooded alarms, tank level indicators)
Sight glasses
Inlet strainer (duplex)
Air vent valve
Pitot tube sampling valve assemblies
Check valves
Manually actuated valves
Motor actuated valves
Explosion proof doors
Separator backwash system

Select and specify as required. For those accessories required in the project, specify detailed requirements (including sizes, ratings, capacities, performance characteristics) in subparagraphs under paragraph entitled "ACCESSORIES [AND ACCESSORY EQUIPMENT]."

NOTE: Review applicable DOD-FGS-Italy and local ASL air pollution and ventilation requirements to determine need for vapor containment.

Provide bolts, stiffeners, washers, nuts, screws, pins, gaskets, and fittings as required for adjustable weirs, [tank covers] and parallel plate packs [or vertical tube packs]. [Provide tank covers with a vapor proof seal for vapor control with [_____] mm inside diameter gas vents and suitable access manways to each separator compartment.]

2.7.1 Security Alarm

Provide a security device with audible/visual alarm annunciator composed of an oil thickness gauge for the amassed oil-level thickness, measured by a stainless steel electrode probe, a buoyant switch, a remote alarm/control panel with frontal plate and synthetic material body, suitable for wall mounting, complete with visual indicating lamps and acousting indicating buzzer, electric feeding of 220 Volt/50 Hz, protection as required by CEI 64-8;V1;V2 and CEI 11-17, worked into place supplied with power cord and connection duct and with any other appurtenances.

2.7.1.1 Underground Control Lines

Provide underground control line that consists of FG70R type [multicore] [____] cable, conforming to CEI regulations and suitable for direct buried installation. Buried cable splices shall not be permitted. Provide plastic adhesive tape for the purpose of jointing cable, of different colors for phase identification, and collars for fitting cables with circuit number identification. Adhesive tape and collars types shall be approved by the Contracting Officer.

2.7.1.2 Surveillance Devices

Provide a surveillance panel (OSAP) including terminal strip for signal cables from the oil-separator pit, feeder cable connection from panel DP, oil thickness push-button, float switch push-button, power contactor of 220 V/4A maximum for alarm horn and flashlight to be connected to the alarm panel (CAP), pilot lights, labels, reset push-button and ground buss. Panel shall be housed in a steel enclosure treated for rust prevention and factory painted.

2.7.1.3 Sensors

Provide all devices and accessories required for an automatic

self-controlled oil-separator system. Sensors shall include:

a. Oil thickness device to sense the level of oil accumulated and send a signal to the OSAP. Depressing the thickness push-button at the OSAP shall activate the pilot light when the security oil level has been reached.

b. Flat level switch to sense the high alarm level in the oil-separator pit.

2.8 FABRICATION

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NOTE: Specific project requirements may include one or more of the following accessories:

Access platforms
Access ladders (with minimum 1050 mm extensions above hatch opening with locking device)
Handrailing
Waste oil transfer pump
Oily waste transfer pump
Sludge transfer pump
Sludge or waste oil storage tanks
Immersion heaters
Tank windows
System monitoring and control instrumentation (e.g. oil content monitor, oil-water interface sensors, control panel, pressure gages, high level alarms, oil flooded alarms, tank level indicators)
Sight glasses
Inlet strainer (duplex)
Air vent valve
Pitot tube sampling valve assemblies
Check valves
Manually actuated valves
Motor actuated valves
Explosion proof doors
Separator backwash system

Select and specify as required. For those accessories required in the project, specify detailed requirements (including sizes, ratings, capacities, performance characteristics) in subparagraphs under paragraph entitled "ACCESSORIES [AND ACCESSORY EQUIPMENT]."

Where the separator is to be mounted in a concrete vault with a hatch cover, the designer shall address, as a minimum, the following:

1. Hatch covers shall provide access to the entire separator.

2. Hatch covers shall lock in the open position.

3. Light weight covers for non-traffic areas.

4. Interior ladder rungs shall not be set away from cover opening so as to require a person to swing in and grab.

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NOTE: Review applicable DOD-FGS-Italy and local ASL air pollution and ventilation requirements to determine need for vapor containment.

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Provide shop fabricated, skid mounted oil-water separator, or other shop fabricated unit approved by the Contracting Officer, which is comprised of a tank containing an inlet compartment, parallel plate [or vertical tube] oil coalescing compartment, outlet compartment [and the following accessories]:

[Tank Cover [with vapor proof seal]]
[_____]

2.8.1 Shop Hydrostatic Test

Prior to applying coatings, perform hydrostatic test at atmospheric pressure by filling tank with water in the shop for a minimum of 4 hours. Testing shall be conducted after all seams have been cleaned and all welds have been inspected in accordance with UNI EN 571-1. Acceptance criteria, for the hydrostatic test, is no leakage after 4 hours using a thorough visual inspection for the leaks.

2.8.2 Reduction of Solids

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NOTE: Designer shall address special influent characteristics as part of the design when using this specification. Special characteristics include, but are not limited to, inflow rate, grit content, viscosity of petroleum product, AFFF foam, heavy metals, and reverse emulsion. Determine need for a solid waste basin preceding the separator and specify solid waste basin requirements when required by site conditions.

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NOTE: If total solids are less than 100 mg/L, these elements may be eliminated after adequate benchscale testing has been completed to support this conclusion. Designer shall indicate run of solids removal line from outlet nozzle to a point above grade.

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Inlet compartment shall reduce [suspended] [settleable] solids to nonclogging level for parallel plates [or vertical tubes,] and provide a uniform oily wastewater hydraulic loading across inlet face of oil coalescing compartment, under laminar flow conditions. Submit proof that separator will not clog given the influent characteristics. Equip compartment with an inlet nozzle with wastewater sampling port, nonclogging flow distributor and energy dissipator device, [primary solids collection hopper,] [primary solids outlet nozzle,] [oil retention weir,] [adjustable surface oil overflow weir with trough,] [primary oil outlet nozzles]. [The oil-water separator shall be preceded by a solid water basin which includes a removable solids or trash basket. Equip the solid water basin with a hoist for servicing the trash basket. Size the basket to retain all solids larger than 75 mm in any dimensions. The solid waste basin shall have a minimum storage volume of [945] [_____] liters.]

2.8.3 Oil Coalescing Compartment

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NOTE: The interpretation of "easily removable" has two meanings in the industry. One is the complete removal of the entire bundle from the separator; the second is removal of individual 300 mm square bundles. The designer shall adapt the specification to the specific demands of the project.

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Equip oil coalescing compartment with easily removable and reinstallable, parallel, corrugated plates [, or vertical tubes] arranged to optimize separation of free oil from liquid carrier. Provide adjustable surface oil overflow weir with trough, oil outlet nozzle and stationary underflow baffle, oil retention baffle positioned to prevent discharge of free oil that has been separated from the carrier liquid in inlet and oil coalescing compartments. Provide access to each plate pack [or tube bundle] from top. Each bundle shall be equipped with handles or lifting rings. Plate designs that permit cleaning of plate packs in place are acceptable. When plate design permits cleaning in place, provide sufficient access to permit complete cleaning of the plates and removal of the sludge.

2.8.4 Wastewater Sampling Port

Equip inlet and outlet compartments, adjustable overflow effluent weir, effluent trough, and wastewater outlet nozzle with wastewater sampling ports permitting easy access for obtaining isokinetic influent and effluent samples.

2.8.5 Connections

Connect the separator at the inlet and outlet pipe invert elevations indicated. Follow equipment manufacturer's recommendation for setting and adjusting top of weir elevations throughout unit.

2.8.6 Storage

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NOTE: In order to size the waste oil tank, the designer shall contact the activity to determine frequency of waste oil collection performed at the activity. Designer shall check current Federal and State requirements governing the need and installation criteria for secondary containment (e.g. double wall waste oil tank).

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Provide oil and suspended solids collection, storage, and transfer systems as an integral part of proposed oil-water separator system. As a minimum, the separator oil storage (tower) compartment shall have a capacity of not less than 10 percent of the total tank volume. The adjacent waste oil tank shall have a capacity of [_____] liters.

PART 3 EXECUTION

3.1 INSPECTION

Inspect each component of separator for compliance with requirements specified in "PART 2 PRODUCTS". Redesign or modification of equipment to comply with specified requirements, or necessary redesign or modification following failure to meet specified requirements, shall receive particular attention for adequacy and suitability. 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.

3.2 INSTALLATION

Lift tank as required without parallel plate packs [or vertical tube packs] in place onto level foundation using lifting mechanism provided. Level tank and bolt to supports to prevent hydrostatic uplift and ensure unit stability. Use a lifting bar through lugs to insert plate [or tube] packs into tank and place on supports. Caulk around packs and pack supports with a hydrocarbon resistant sealing compound to prevent hydraulic short-circuiting. Avoid abrupt contact between the packs and the tank walls and pack supports to avoid damage. Separator system installation shall be conducted in accordance with manufacturer's recommendations.

3.2.1 Installation of Cables

Cables shall be installed in compliance with CEI 11-17. Install control cables in trenches as indicated on drawings. Drill and cut holes and construct trenches in existing structures with care and restore existing surfaces to their original condition. Pulling of cables into the trench from a fixed reel position shall not be permitted. The radius of bends in cables shall not be less than 10 times the diameter of the cable. Connect power and signal cables to the power panel and the equipment. In no case shall cables be left under longitudinal tension. Cables shall not be spliced but cable ends shall be adequately jointed with plastic adhesive

tape of different colors for phase identification and fitted with collars for circuit number identification at each end and at joints.

3.3 FIELD QUALITY CONTROL

3.3.1 Field Hydrostatic Test

After separator has been leveled and secured to foundation and parallel plate packs [or vertical tube packs] are in place, level effluent overflow weir at elevation specified by manufacturer and hydrostatically test unit at atmospheric or operational pressure (for no leakage) for an additional 8 hours by filling with water. Perform the hydrostatic test prior to backfilling below ground or partially below ground installations.

3.3.2 Preoperational Test

The manufacturer's service representative shall inspect, operate, and test unit before in-service testing by the Contractor.

3.3.2.1 Tests

Tests shall include but not be limited to the following:

a. Soundness (without cracked or otherwise damaged parts).

b. Completeness in all details, as specified.

c. Correctness of setting, alignment, and relative arrangement of each component.

d. Verification of proper operation for all system components.

3.3.2.2 Preoperational Investigation and Test Report

Submit manufacturer's service representative's preoperational test report. Document inspections, operations, adjustments, and tests performed and indicate whether they were acceptable or not. For unacceptable items, describe corrective action taken or recommended. Include detailed descriptions of points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. Include the manufacturer's certificate that equipment conforms to specified requirements and is ready for permanent operation and that nothing in installation will render manufacturer's warranty null and void.

3.3.3 In-Service Test

After hydrostatic test and preoperational test have been successfully completed and unit has been properly connected to influent and effluent piping, allow influent oil-in-water mixture previously described in paragraph entitled "SYSTEM DESCRIPTION" to flow into separator filled with water. Adjust and level [primary] [and secondary] surface oil overflow weirs to optimize oil skimming and minimize water overflow to oil recovery. Optimize operation of unit within 5 working days. Operate unit for a

minimum of ten tank volume changes prior to testing for removal of contaminants and document testing results.

3.3.3.1 Analytical Methods

Test and sample preservation methods for test contaminants shall be in accordance with the latest revisions of EPA MCAWW, EPA Methods for Chemical Analysis of Water and Wastes, or those substitute methods approved by the local ASL.

3.3.3.2 Test for Contaminants

Verify the separator efficiency by testing influent and effluent for contaminants described in paragraph entitled "Performance Requirements." If effluent quality is found to be unacceptable, then verify influent to effluent performance in particle size removal at the site. Tests shall be performed by an independent certified testing laboratory.

3.3.3.3 Sampling Procedures

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NOTE: The separator top hatch covers are used by many manufacturers to satisfy the sampling port requirement. The designer has the option to provide dedicated sampling points integral to the influent pipe and effluent pipe.

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Within an 8 hour period and at regular intervals collect a minimum of 10 influent and effluent samples from sampling ports provided as part of the separator. Purge each sampling port to remove built-up solids or other material prior to collecting sample. Collect wastewater samples isokinetically in clean glass containers with polytetrafluoroethylene lined caps. Collect duplicate wastewater samples in separate glass containers. Do not attempt to split sample. Use containers for other contaminants as recommended in references listed in paragraph entitled "Analytical Methods."

3.3.3.4 Acceptance Criteria

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NOTE: Based on standards or guidelines established by environmental regulatory agency(ies) in which the project is located or based upon wastewater treatment process(es) that follow downstream from this separator, specify the maximum unacceptable limit permitted in order for the separator to be accepted as meeting the performance requirements of this specification.

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90 percent of the effluent samples taken shall not exceed the specified daily maximum limit for [grease and oil] [petroleum hydrocarbon] contaminants. The remaining samples shall not exceed [[_____] mg/L for grease and oil] [[_____] mg/L for petroleum hydrocarbon] contaminants. If

the separator does not meet requirements of this specification, due to poor workmanship and wrong fabrication dimensions, the unit may be rejected. If the unit is not operating at design efficiency 5 days after installation, Government may reject system. In the event Government rejects unit, Contractor shall remove separator or defective components and replace with acceptable unit or components and test as specified above.

3.3.4 Electrical Tests

Provide all tests of the entire system as prescribed in CEI 64-8;V1;V2, part 6. Tests shall include, but not be limited to, the following:

3.3.4.1 600-Volt Wiring Test

Test 600-Volt wiring to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring of size 6 sq. mm and larger diameter using an instrument that applies voltage of approximately 500 volts to provide direct resistance reading. Minimum resistance shall be 250,000 Ohms.

3.3.4.2 Grounding System Test

Test grounding system to ensure continuity, and that resistance to ground does not exceed the necessary value to coordinate the protective devices in accordance with CEI 64-8;V1;V2. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test system for resistance to ground. Make resistance measurements in dry weather, not sooner than 48 hours after rainfall. Submit written results of each test to the Contracting Officer, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

3.3.4.3 Ground Fault Interrupter Test

Perform the trip test of ground fault interrupters in accordance with CEI 64-8;V1;V2 requirements.

3.3.4.4 Coordination of Protective Devices

Perform calculation and tests to demonstrate that the protective devices are coordinated with ground resistance system.

3.3.4.5 Fault Loops Impedance Test

Perform the test of fault loop impedance in accordance with CEI 64-8;V1;V2 requirements.

3.3.4.6 Special Systems Test

After installation of all system components, conduct an operating test. The equipment shall be demonstrated to operate in accordance with the requirements of this section.

-- End of Section --