WaterWolf™ Dynamic Oil Recovery System

The WaterWolf Dynamic Oil Recovery (DOR) system is a complete water treatment system that recovers oil and removes suspended solids from produced water in a single stage of treatment without the use of chemicals. Effluent water quality from the WaterWolf DOR is equal to or better than the quality produced from most conventional gas flotation systems and it can handle produced water directly from separators and crude treaters with no intermediate oil skimming step.

The WaterWolf DOR combines deoiling and desanding hydrocyclones with the non-shearing action of Moyno™ progressing cavity pumps. Produced water is partially recirculated within the system in a Dynamic Loop which maintains ideal process conditions for both hydrocyclones with optimum efficiency and 100% turndown. The WaterWolf DOR does not rely on upstream separator pressure and will provide consistent performance regardless of variations in flowrate or pressure from the upstream water source.

Since solids are removed from the water separately from the oil, the discharged solids are practically oil free, eliminating the oil contaminated, chemical sludge that is produced by the gas flotation process. The recovered oil is also uncontaminated by chemicals or solids and can be returned directly to the separation process, bypassing a closed drains or slops handling system.

WaterWolf DOR models with up to 16,000 BPD capacity per skid can be shipped to location in a standard shipping container or flatbed truck. Higher capacity models can be delivered by non-permit loads to most locations. The WaterWolf DOR offers significant construction cost savings by eliminating pumps, tanks, controls, vapor recovery, gas blanketing, and air emissions permitting. Installation requires a small level site, 3 main process connections and a 480V, 3 phase power supply. Most onshore DOR installations can be completed in a day with a modest work crew and crane truck. Start-up and operation is simple and on-site training for operators can be accomplished in about an hour.

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SPECIFICATIONS-MODEL DOR 175

Pressure Vessels

Vessel Design: ASME Section VIII, Div. 1
Design Pressure: 260 psig @ 200°F
Materials: Carbon steel shell and heads, cast iron victaulic Couplings with machined coupling ring grooves, and 316 SS cyclone support plates
External Coating: 2 coat blue epoxy
Internal Coating: 2 coat immersion grade epoxy

Progressing Cavity Pumps

Manufacturer: NOV/Moyno
Casing Material: Carbon steel with cast iron discharge flange
Drive Mechanism: Stainless steel flexi-shaft
Stator: Performance Oilfield Buna (POB)
Rotor: Low alloy tool steel with hard chrome plating
Seal: Cartridge mechanical seal on gland end
External Coating: 2 coat blue enamel

Piping

Design: ANSI B31.3
Materials: Carbon steel
Connections: ANSI 150# flanges for 2" and larger and solids slurry lines, socket weld for under 2"
External Coating: 2 coat blue epoxy
Internal Coating: None
Valves: Isolation valves: 3" and larger to be lug body, resilient seated butterfly valves, 2" and smaller to be ball valves with carbon steel body/stainless steel trim. Slurry discharge to be full bore ball with hardfaced trim.
Instrument Connections: 1/2" stainless steel ball valves

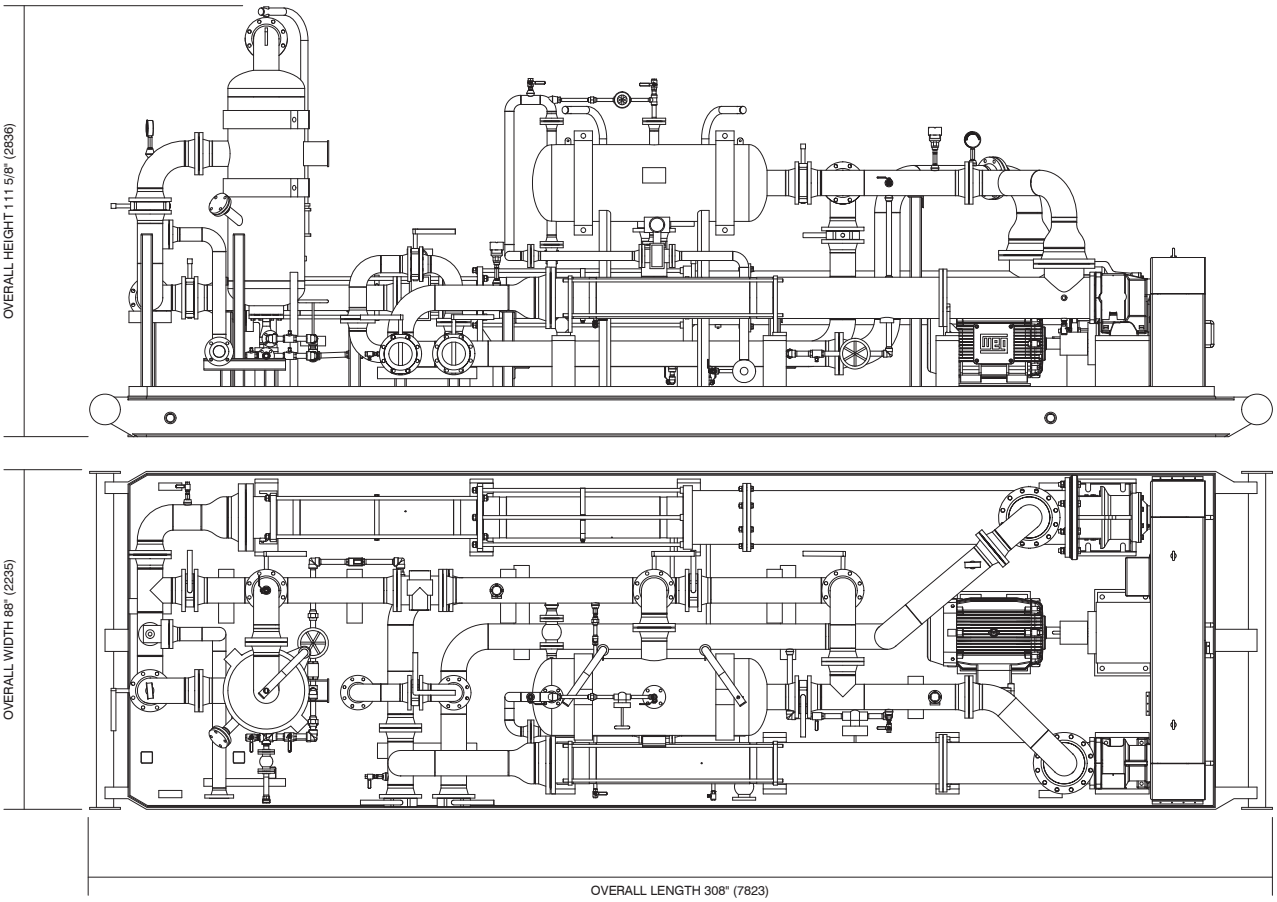
Controls and Electrical

Area Classification: Class 1, Div. 2 - intrinsically safe
PLC and Display: Allen-Bradley panelview
Enclosure: Nema 4X stainless steel
Process Transmitters: 4-20 mA HART protocol
Wiring: Class 1, Div. 2 with cable tray support
Electric Motor Drive: 100 HP TEFC, 1800 rpm, 1.15 SF, Class F insulation

Structural

Design: Robust oilfield skid, carbon steel i-beam construction, checkered deckplate, welded pipe and equipment supports, 4" perimeter combining, 2" threaded drain connections at each corner, pull bars at each end.
Coating: Two coats blue epoxy

WaterWolf™ Model DOR-175



Ship Weight: 9 tons

Termination Point Table					
Size	**Service**	**Connection**	**'X'**	**'Y'**	**'Z'**
6"	Inlet	ANSI 150# RF	90-7/8"	2-7/8"	21-1/2"
6"	Water Outlet	ANSI 150# RF	77"	2-7/8"	21-1/2"
2"	Oily Reject	ANSI 150# RF	166-3/8"	2-3/8"	17-1/8"
1"	Slurry Outlet	ANSI 150# RF	42"	1-5/8"	15-5/8"
3"	Pressure Relief	ANSI 150# RF	29-3/4"	2-7/8"	21-1/2"
2"	Skid Drain	NPT 3000#	17"	1-1/8"	4-7/8"
2"	Skid Drain	NPT 3000#	246-1/4"	1-1/8"	4-7/8"
2"	Skid Drain	NPT 3000#	17"	86-7/8"	4-7/8"
2"	Skid Drain	NPT 3000#	246-1/4"	86-7/8"	4-7/8"

Configuration Table				
DOR175-	**A**	**B**	**C**	**D**
Gross Flow Rate (BPD)	18,020	14,510	11,605	9,030
Net Treated Water Capacity(BPD)	16,390	13,170	10,530	8,190
Oily Reject Flow Rate(BPD)	1,630	1,340	1,073	840
Power Consumption (kW)	50.4	40.0	32.0	24.9
Qty 2" Ceramic Desanding Cyclones	31	25	20	15
Qty 2" Desanding Blanks	0	6	11	16
Qty 1.5" Deoiling Cyclones	43	35	28	22
Qty 1.5" Deoiling Blanks	0	8	15	21

*The model DOR-175 can be configured for different flow rates per the configuration table. Optimum water quality is achieved with a configured flow rate that is greater than the maximum instantaneous flow rate of water to be treated.

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