



THE PROVISION OF WELL SERVICES DIVISION

1- Coiled Tubing Services

Coiled Tubing (CT) are designed to improve your well and reservoir performance. CT applications include Acid Stimulation, Milling, Paraffin Removal, Cementing, and Sand Clean Out, Nitrogen Lifting, Setting Packers and Plugs, Solid Removal, thru- tubing fishing.





2-Stimulation Services

1000/500 HHP high - Pressure pumping system are designed for coiled tubing support and stimulation services. They are comprised of a twin or single 25 BBL displacement tanks, all required controls and instrumentation and a hydraulic system to drive fluid handling and mixing. The unit is complies with the strict safety standards for offshore industry.





3-Nitrogen Services

This system is designed to supply a continuous flow of N₂ at a total flow rate of 3000 scf/m at a delivery pressure of 10.000 psi. The system mounted on a •Skid for ease of movement and transport.













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180K HEAT RECOVERY NITROGEN PUMPING SKID

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I. Equipment Listing

Gulf Energy's equipment list that are available to provide the petroleum industry with the Coiled Tubing, Stimulation and Nitrogen services.

1.0 Coiled Tubing Units 1 1/4" & 1 1/2"

- 2 ea 1 $\frac{1}{4}$ Coiled Tubing Unit complete with > 17,250 ft Tbg.
- 2 ea 1 $\frac{1}{2}$ Coiled Tubing Unit complete with > 13,700 ft Tbg.
- 1 ea Spare Tubing Reel > 13,700 ft with conversion kit for Injector & BOP.
- 1 ea 1 ¹/₄" Conversion kit for injector & BOP.
- 2 ea High Quality Down hole special & fishing Tools.

2.0 Nitrogen Equipment

- 2 ea 180 K N₂ Unit.
- 4 ea 2000 USG LN₂ Tanks.
- 2 ea 5500 Gal LN₂ Tanks.
- 2 Set 2" Iron (10,8 & 4 ft) joint, Loop, Swivel & Valves,..... etc.

3.0 High Pressure Fluid Pumps

- 2 ea NOV Twin 3 ¹/₂" "500 HP" High Pressure fluid pump.
- 2 Set 2" Iron (10,8 & 4 ft) joint, Loop, Swivel & Valves,..... etc.
- 2 Set Hoses 4" & 2" (low & high pressure).

4.0 Transfer Pumps

- 4 ea C-Pumps.
- 2 ea Acid Transfer Pumps (Delasco Pumps).

5.0 Storage and Mixing Tanks

- 2 ea 50 M³ (300 BBL) Storage and mixing tanks.
- 8 ea 1300 USG Raw Acid Storage Tanks.
- 2 ea Batch Mixing (20 BBL).

6.0 Filtration Unit

• 2 ea Duplex Filter Unit C W /hoses.

7.0 Data Acquisition System

- 2 ea Complete Data Acquisition systems.
- 4 ea pumping Data Acquisition systems.

8.0 Transportation System

6x6 Trucks, Trailers, Cranes and 4x4 Light vehicles for Equipment and Personnel Transportation. (Details shall be supplied on request).

9.0 Acid and Stimulation Products

Wide range of acidizing and stimulation fluid system additives can be sourced:

Acid Acid gel system Anti-Sludge Additives Clay Stabilizers Corrosion Inhibitors Cross-linked gel system Paraffin removal system Diverting Agents Emulsifiers

Fluid Loss Control Friction reducers Iron control Mutual Solvents Non Emulsifiers **Retarded Acid** Sandstone Acidizing Scale Inhibitors Scale removal additives Surfactants Water based polymer and gel systems Stim Well Disolvine





II. Coiled Tubing Services

1.0 COILED TUBING UNIT

This Desert CTU on Tractor system is designed to minimize operation times and to maximize chances for live well workover for success by providing comprehensive technical support for CT operations. Our units are designed to the customer's specific requirements for depth, tubing size and environmental conditions for land operation.

2.0 COILED TUBING APPLIC ATION



Coiled Tubing services range from conventional to more advanced types applications. The company engineer's experts in the application of coiled tubing use tested, reliable and versatile equipment to meet each client's need in every type of situation to help increase production at lower costs safety is key on every coiled tubing job. We offer land coiled tubing units along with nitrogen and pressure pumping equipment with varying capabilities and specifications.

Acid Stimulation Paraffin Removal Sand Clean Out Setting Packers and plugs Thru-tubing fishing

Milling Cementing Nitrogen Lifting Solid Removal



3.0 Coiled Tubing Units Available:

-	GECTU-1	GECTU-2
C.T Size (in)	1 ¼" & 1 ½"	11/4" & 1 ½ "
No. of Units available	1	1
Manufacture Year	2019	2019
Maximum Pull (LB)	80,000	80,000
Maximum Snubbing (LB)	40,000	40,000
Length of Tubing On Operating Reel (Ft)	17,250 ft	17,250 ft
Weight of Operating Reel (Ton)	16.4	16.4
Reel Dimension WxLxH	102" X 175" X 144"	102" X 175" X 144

4.0 COILED TUBING SPECIFICATION

Pipe Sizes 1-1/4" 1-1/2", 1-3/4" Injector Capacity 80,000 / 40,000 P. Control Equipment 3-1/16" 10,000 PSI







1.0 HIGH PRESSURE OPEN LOOP TRUCTOR POWER

The Tractor Power has a Diesel Engine, rated for Kenworth T800, Cummins ISX 565, Twin Steer, TRIDEM Drive ALLISON 4700, 109,000LBS GVWR. The power mounted control panel is stainless steel / waterproof and includes:

- 1. Throttle System for Engine Speed Control.
- 2. Engine Kill.
- 3. Emergency Engine Air Shutoff.
- 4. Remote Shutoff Devise.
- 5. Anti-Static Fan Drive Belts.
- 6. Spark Arrestor.
- 7. Air Starter.
- Engine has System for Shutdown On; Over Temperature, Over Speed, Loss of Coolant, Loss of Oil Pressure. Fuel Shutdown Valve,
- 9. The Drive Belts are Fully Guarded.
- **10.** A 40 Gallon BOP Accumulator System is Rated at 3000 Psi. This provides adequate volume for operating a 3.06 QUAD.
- **11.** The Injector Drive System Utilizes A Denison P-12 AXIAL PISTON High Pressure Open Loop Pump. This System, Including Hoses, Is Rated at 5000 Psi.





2.0 CONTROL CABIN

The Cabin is Constructed of Composite Walls and Floor joined so that Cabin elevates as a Unit via four (4) Hydraulic Cylinders. Interior Space is approximately 90" W X 84" H X 52" D, Full functional with AC. a Mechanical Lock is provided to ensure the Cabin Stays in position once elevated.

2.1 Access to the Cabin is via a Platform that slides out, with a ladder that forces the operator to mount the platform parallel to the Cabin Rather than facing it. The Access Ladder and Platform will have handrails. The Grating of the platform is designed to minimize risk of slipping.
2.2 The CAB is totally enclosed and insulated with a swing out Access Door.

2.3 The Cabin has a front window is made of high strength glass, 1/4" thick. This window is the full width of the Cabin. The MESHIN the crash frame protecting this window is mounted in-board of the frame.





2.4 Two Sliding Windows are place on the rear and side of cabin.

2.5 2 Exterior and 2 Interior Flood Lights explosion proof are furnished.

2.6 Air Horn that is operated from cabin panel is provided.

2.7 Electrical Air Conditioning and heating unit top mounted.

2.8 Breaker Box in cabin and shore power receptacle installed exterior.

2.9 A Small Panel Mounted on the wall.

2.10 Charts for recommended pressure for Injector Traction and Tension Pressure.

2.11 Control Console, of the "L" Shape Design, Includes the following:

2.12 9-Bank Valve for BOP control with lockout.2.13 Latch. One Bank will be used to activate the valve.

2.14 BOP Pressure Gauge.

2.15 Weight Indicator for Injector, 80,000 Lbs to be mounted center of panel.

2.16 Air Regulator Valve, Pressure Valve, Bleed Valve and Gauges to operate two (2) Dual Acting Strippers. Hydraulic Supply for Stripper is Air-Over-Pump with manual override.

2.17 Pressure Regulator Valve with isolation and Gauges for three (3) Injection Traction Circuits.

2.18 Control Valve for Injector Speed and Direction, with 0-600 Psi Gauge.

2.19 Selector Valve for Injector Brake and Variable Displacement Control for Injector Motor.

2.20 Gauge for Injector Brake Pressure.

2.21 Pressure Gauge for Reel Tension.

2.22 Valve for Reel Brake.

2.23 Hydraulic Pressure Gauge (4") for Injector Pull.

2.24 Hydraulic Valve, 3-Bank for Reel Control i.e.

Reel Pay-Off or Take-Up, Level Wind Raise and Lower, and Level Wind Override.

2.25 Relief Valve for Reel Tension Controls.

2.26 Pressure Control Valve for setting Injector Pull Control.

2.27 Two (2) 6", 15,000 Psi Pressure Gauge for Wellhead Pressure and Circulating Pressure to be mounted to right of Weight Indicator. Both Gauges 4:1 De-boosted.

a. Air Controls for engine speed, kill and emergency kill.

b. Pressure Control with Gauge for Injector outside Chain Tension Control.

- c. Air Pressure Gauge.
- d. Valve for Slow Speed Control.
- e. Injector inside Traction Pressure Drain Valve.











3.0 TUBING REEL ASSEMBLY

3.1 Tubing Spool: Gear Drive, with full design.

3.2 Tubing Guide Counter Coil Solutions, fully adjustable for Tubing Sizes of 1" through 2.88". With Vertical Slide mount to compensate for Pay-Off Angle.

3.3 Internal & External Plumbing 2X2 Valves Standard, H₂S Integral 1502 Type fittings rated at 10,000 Psi Sour Service; Tee for Ball Launching or Wireline Adaptation; 2X2 Shutoff Valve between Swivel and Drum Core.

Dual Inlet connections and 2X2 Shutoff Valves between Swivel and Inlets; Flange mounted Circulating Swivel: 10,000 Psi 2" Bore Swivel; Proof-Tested to 15,000 Psi; suitable for H₂S Service; Components exposed to circulating fluids are replaceable. 4:1 De-booster to monitor circulating pressure.

3.4 C.T. Reels: 1 ½" and 1 ¾" Heavy Wall {0.125": 0.134"}.

3.5 Lubrication System: TBG Oiler mounted from counter; 30-Gal. Lub. Reservoir.

3.6 Two Point Lift System: Spreader Bar Arrangement for lifting entire loaded Reel Assembly or Loaded Drum only; Solid Link Design; Spreader Bar stamped "100,000 lbs."; Two leg sling with shackles, master link and thimbles, tagged with load limit.

3.7 Data Acquisition: mount for encoder installed. **3.8** Qty. Two (2), Spool: 142" outside diameter Rim, 72" inside width, 84" core diameter lift lugs; tie down plates on outer Rim. Both spools fitted with internal plumbing and Swivel. Each spool capable of accommodating 25,000 Feet of 1.50 Tubing, or 13,500 ft of 2.00 Tubing.



4.0 INJECTOR HEAD COIL SOLUTIONS

This Injector is designed for handling C.T. Sizes from 1-1/4" OD through 3-1/2" OD. With the following capacities:

80,000 lbs. Continuous Pull Capacity.

Snubbing Capacity is 40,000 lbs.

Maximum Speed 200 feet per minute.

Structures and Ancillary System are designed to the 80,000 lb.

Tubing Load Limit, Plus Gross Weight of Injector (12,500 lbs.)

Gooseneck 72 inch.

4.1 The Injector drive consists of dual planetary gear transmissions with deep reduction ratios.

4.2 The drive sprockets are one piece for prices alignment and strength.

4.3 The brake control system is automatic / manual set. Are spring applied / pressure released.

4.4 The Hydraulic Drive Motors are directly attached to counterbalance safety valves to prevent loss of control if power failure occurs.

4.5 Injector supplied with the patented "Quick Connect" Chain Assembly capable of running Grippers for 1-1/4", 1-1/2", 1-3/4", 2", 2-3/8", 2-5/8", 2-7/8" and 3-1/2" Tubing.





4.6 The Tubing Grippers are a grooved and hardened, single piece, half round configuration, elastomeric ally balanced for optimum tubing grip. Each of the carriers is supported by dual, sealed for life, heavy duty bearings.

4.7 Tubing traction system incorporates three (3) independent set of two (2) rod type Hydraulic Cylinders. Tubing traction is applied to the chain system through a pair of

4.8 Single piece reversible, thru hardened and ground steel skates. The skate system is designed for self-centering for uniform gripper and tubing loading. The traction system is remote controlled from the operator's console.

4.9 Adjustable position, 72" Radius, Tubing Guide Arch, with flared fold under tail and contoured steel rollers.



4.10 Dual single acting hydraulic load cells to provide direct pipe heavy / pipe light weight indication.

4.11 A pin on mount for stripper is provided on the Injector Base.

4.12 Lifting / Crash frame has 4-Point sling attachment points and is rated for 95,000 lbs.

operational lifting capacity. The standard 4-Leg sling assembly is provided. This sling assembly is for lifting the Injector during shipment and wellsite installation.

4.13 One (1) Set of steel short fixed legs for supporting the Injector with Stripper mounted is provided in addition four Aluminum Extension Legs.

4.14 A Stainless Steel Injector Load Chart for Cabin included.







5.0 PRESSUER CONTROL EQUIPMENT

All alloy components in contact with pressurized well fluids conform to NACE specification MR-01-75 for H₂S Service.

5-1 (3.06" 10K SIDE DOOR STRIPPER PACKER) The Side Door Stripper Packer is designed to pack-off on coiled tubing as it is stripped in and out of the well, at working pressures up to 10,000 psi. This design permits the replacement of the packing elements and bushings through the open "window" below the injector. Changing packers is always easier, but it is particularly advantageous when changing packers with tubing in the well.

5-2 (3.06" 10K Quad BOP)

The 3.06" 10K BOP is designed for coiled tubing and snubbing operations. The ES is the lightest in the industry. The com pact size allows easier handling along with easier maintenance. All actuators feature power hydraulic ram change, low bonnet bolt torque requirement, and a pressure balance piston For shear operations (no booster required). Internally ported hydraulics (no external plumbing) eliminate the making and breaking of oil seals when changing or servicing ram s; thus removing the possibility of environmental pollution **FEATURES**

- Light and Com pact
- Low Bonnet Bolt Torque
- W ell Pressure Isolated Seals
- Independent Bonnet Testing
- No Welds Solid Body

• Ram s - Blind, Pipe, Slip, Shear, Shear Seal, Pipe Slip FULL SET OF WELL HEAD X-OVER



- Pressure Balance Piston
- Internal Equalizing Valves
- Hydraulic Ram Change
- Internal Porting
- Ram Position Indicator







III. <u>Stimulation Services</u> MULTI-PURPOSE DOUBLE PUMPER



1.0 GENERAL DESCRIPTION

The OFM - 600 HP is a Double Pump. The unit is comprised of a high pressure pumping system, twin 10 bbl displacement tanks, all required controls and instrumentation and a hydraulic system to drive fluid handling and mixing. The unit incorporates emergency shut-off valve for air intake, Anti-static fan belts, non-sparking fans and spark arresting silencers.

1.1 Triplex Pump

The OFM Short triplex pumps are 600 HP rated horizontal single acting plunger. One 600 HP pump powered by truck engine and one 600 HP pump powered by a deck engine through an Allison transmission. Pumps fluid ends are made of alloy steel and are recommended for pumping acid, water, brine, drilling fluids, cement and other Well service fluids. The displacement tanks consist of two 10 bbl compartments with calibrated ½ bbl m arks. Tanks have full flow piping for ease of cleanup.

1.2 Single Pump

Plunger S	ize	Weight	Length	Width	Height
3.5"		11 T	7.3 m	1.3 m	3.35 m

1.3 Triplex Pump Rates

High pressure pump rate of 37 gpm at 10,394 psi, 75 gpm at 9,713 psi, 225 gpm at 3,886 psi, and 337 gpm at 2,591.

2.0 ST ANDARD EQUIPMENT SPECIFICATION:

Heavy duty oilfield unit with crash frame Twin 10 bbl displacement tanks

Two centrifugal pumps for loading displacement tanks and boosting triplex Control panel labeled Figure 1502 (15,000 psi) sour gas discharge manifold

Remote readout capability for CT unit compatible with D.A.S for CT

605 horsepower Cummins ISX engine 2050 ft/lbs torque Heavy Duty Radiator and Fan Assembly Engine Oil Cooler and High Capacity Water Filter







Two OFM Short triplex pumps 600 HP, with 3.5" diameter plungers Two 6061 Allison automatic transmission with electronic shift control Two Fuller 2:1 gear reduction boxes

Two 90 US gallon fuel tanks, 180 gallons total – minimum

Sufficient lights for night operations

3.0 ENVIRONM ENT PARAMETERS

The equipment will meet or exceed the following operating parameters:

50°C

- 20° : Operating Temperature

<90% Relative Humidity

4.0 OPERATIONAL PERFORMANCE

The unit will be capable of operating on land.

The unit will be equipped with sufficient lighting for night operation.

5.0 POWER SYSTEM (Diesel Engines)

Two diesel engines will be mounted reasonably and used to drive two high-pressure triplex pumps via transmissions and flexible drivelines. The engines will also power hydraulic pumps to drive the two centrifugal pumps and will be remote controlled from the operator console.

6.0 Engine Accessories

Type: 605 horsepower Cummins ISX engine rated Power: 600 BHP @ 2100 rpm

Air starter w/non-sparking engagement.

Electronic governor, Water circulating pump and radiator assembly Non-sparking exhaust fans driven by anti-static belts.

Lube oil pump and filter and cooling system, Fuel pump and filter system.

Heavy duty air filter (dry element type) with restriction indicators.

Throttle actuator - Stop actuator

Emergency kill actuator for air intake shutdown.

Spark arresting steel mufflers with flexible connection and rain cap.

Air compressor and receiver system to meet pneumatic requirements of the unit. Alternator, 12 volt (both engines)

Triplex pump over pressure shutdown switch to return engine to idle

Two (2) 90 US Gallon (378.5 liters) fuel tanks, 180 US Gallons (681 liters) total.

Fuel coolers will be mounted securely to the radiator frame.

7.0 POWER DISTRIBUTION SYSTEM (Transmissions)

Two 6061 Allison automatic transmission with electronic shift control converter rated at 1575 ft lb torque, complete with fill tube, dipstick gauge, torque converter, and 1800 series output flange. **8.0 POWER END LUBRICATION SYSTEM**

Positive displacement pumps driven by full time PTOs supply the lubrication system for each triplex pump power end or engine accessory drives if required to accommodate power requirements. The following components are standard equipment for the lubrication system.

Lube oil reservoir with manual temperature gauge Pressure gauge and

Pressure relief valve

Required plumbing and hoses.

Full flow filter with element condition indicator & by-pass





9.0 Plunger Packing Lubrication System

The plunger lubrication system is provided by a pressurized oil supply system. The following components are standard equipment for the lubrication system.

Lube oil reservoir Distribution manifold Required plumbing and hoses Pressure gauge Pressure regulator Packing lube catch tank

10.0 FLUID HANDLING SYSTEM (Displacement Tanks)

The displacement tanks will consists of two 10 bbl compartments each having graduated markers measuring in increments of ½ bbl for a tank total volume of 20 bbl and hydraulically driven agitators. The tanks are constructed of steel with reinforced structures. The discharge ports from the displacement tanks are 6-inch butterfly valves leading into a 4-inch pipe for gravity flow to the boost pump and triplex pumps. A flow back release line is provided to allow the triplex pump pressure to be discharged back to the displacement tanks. Standpipes provide overflow protection and are connected to drain hoses to control over flow off deck components. 3-inch remote operated drain valves are also provided for each tank compartment. The piping manifold is designed with sufficient couplings to allow complete disassembly of the piping.

11.0 Roadside / Curbside Centrifugal Pump

The 5x4 Mission Magnum Sand master curbside centrifugal pump will meet the following specifications:

Suction: 5 inch (152.4 mm) pipe size Discharge: 4 inch (127 mm) pipe size Max. flow rate at W P rating: 11 bpm Rated working pressure: 50 psi Lubricated opposed double lip seals

Mechanical face seals

The curbside centrifugal pump receives fluid from an outboard source via a 4-inch figure 207 connection or from the displacement tanks.

The curbside centrifugal pump will discharge fluid into the displacement tanks,

Off board via a 4-inch figure 207 connection or boost the triplex pumps.

12.0 The following design will be provided in the low-pressure piping

Suction stabilizers will be used on the inlet side of the triplex pumps. The suction manifold working pressure rating is 175 psi.

Remote valves that are required for normal operation will be air actuated. Will feed to the suction manifold of the plunger pumps via 4-inch pipe and butterfly valves. The suction manifold of the triplex pumps will take from the displacement tanks and from outside source via 4-inch male figure 207 connections.

An over pressure relief valve is included and is located to facilitate easy rem oval and maintenance.

The roadside and curbside centrifugal pumps are plumbed such that either pump can receive fluid from an outboard source or from the displacement tanks and discharge to one or both triplex pumps or the displacement tanks. In a typical operation one centrifugal pump would fill the displacement tanks while the other pump charges the triplex pumps.





13.0 HIGH PRESSURE DISCHARGE MANIFOLD

Each of the triplex pump fluid end discharge ports will be 2-inch threads. The manifold will be rated for sour gas service. Connected to the discharge ports will be 2-inch 1502 integral plug valves. The two triplex pumps will be manifolded together configured so as to be capable of discharging singularly or simultaneously to the same or separate outlet joints. The release manifold will have a flow-back pressure release line with an open end connected to the displacement tanks. A 2-inch x 2 inch 1502 integral plug valve stacked in series with a 2 inch x 1 inch 1502 integral plug valve will control the release line. Manifold pressure will be measured via a 15,000-psi pressure gauge. A pressure relief safety valve will be provided and will be plumbed to direct discharge down.

The following specifications will be standard for the discharge manifold:

Diameter of discharge pipe and fittings: 2 inch (50.8 mm) Rated working pressure of discharge pipe and fittings: 15,000 psi Test Pressure of Discharge pipe and fittings: 22,500 psi Rated Working Pressure of Plug Valves: 15,000 psi Discharge pipe couplings: NPS pup joints w/1502 Union High-pressure piping & components Sour gas service

14.0 OPERATION AND DISPLAY SYSTEM 14.1 Operators Platform

The operator's platform will provide access to the discharge valves. This platform extension will extend to the rear of the triplex pumps.



14.2 Operator Console

The Operator Console is a custom-built steel cabinet with a protective steel cover. The location of the console will allow the operator a full view of the well site operation. The console is mounted on the operator's platform.

The engine gauges will include oil pressure gauges, water temperature gauges and voltmeter the transmission gauges will include the main oil pressure, oil temp. and fluid level sight gauge.





The triplex pump gauges will include oil pressure gauge, oil temperature, and an oil level sight gauge. The pressure and temperature gauges will be the switch gauge type that will activate a warning light whenever a certain level is reached.

The hydraulic system will have pressure gauges for each pump circuit and an oil temperature gauge mounted on the oil reservoir.

The console will have sufficient light to allow for operation during night hours.

Most gauges shall be dampened to normalize minor pressure fluctuations and instruments will read in both Imperial and Metric standards.

The centrifugal pumps are equipped with pressure gauges.

Pump displacement rate will be measured at the input to the triplex pump by a proximity switch. Triplex pump pressure will be measured via a Viatran 0 – 15,000 PSI pressure transducer.

Integrated over-pressure shut down will return engine to idle and shift the transmission to neutral. **14.3 Remote Record & Display**

The discharge pressure will be recorded on a Martin Decker circular chart recorder.

The recorder will have a 4 hour clock, single pen and 5" gauge. The unit will be equipped to provide a rate signal for either pump to an off board D.A.S. for CT system display and recorder. The cable for the each rate sensor will terminate on the curb side of the unit and be mounted on the triplex pump base.

15.0 Mixing Equipment

Various types and sizes of mixing equipment are available for stimulation treatments depending on job volumes and design. Mixing tanks or recirculating mixers can be used for small volume fluid blending whilst more sophisticated fit for purpose continuous mixing blenders are used for high volume operations.

Recirculating mixer sizes typically range from 75 bbl recirculation mixers to 150 bbl and 150 bbl twin compartment mixers. These will mix and recirculate the stimulation fluid and delivers it to the pumping unit. The fluid is maintained as a homogeneous and consistent blend. The mixers are capable of transferring fluid from remote sources whilst simultaneously recirculating. Raw acid is usually transferred from lined or coated tanks using fit for purpose acid transfer pumps. The Twin 150 bbl Mixer is capable of mixing 300 bbl of fluid at one time and conforms to the following general specifications or similar:





15.1 Stimulation Fluid Storage and Transport Equipment

Depending on requirements a number of types and sizes of bulk storage and transport equipment can be offered. This may range from small acid carbouys (300 bbl capacity) large volume fluid storage tanks. Fluid transporters typically come in 300 bbl sizes. Raw acid transporters usually have rubber lined tanks.



15.2 Acidizing and Stimulation Products

A wide range of acidizing and stimulation fluid system additives can be sourced Whether you need a small matrix acidizing package, a high pressure pumping unit, a certain chemical, a specific fluid system or a whole fleet

Gulf Energy has the ability to meet your needs.

15.3 Laboratory Services

Gulf Energy bases have central laboratory to carry out all needed analyses for field operations. These base laboratories are run by qualified personnel who provide support and services to all the mobile labs in all the sites where we operate.

Acid Tests

- Emulsion
- Solubility
- Corrosion
- Water Analysis





16.0 CARTRIDGE FILTER UNIT

Filtration is a key element to a cost-effective oil and gas field services; in drilling, work over and completion operations. Fluids which are not carefully sized can cause costly formation damage. Gulf Energy provides filtration services to its clients to meet with their requirement, save additional cost of well stimulation and avoid related operational problems due to non-filtered fluids especially across the pay zone.

On a typical job, Gulf Energy would provide its two stages, skid mounted, easy to handle filtration vessels. A primary and a secondary filtration stage are usually carried out together. In the primary filtration stage the fluid is cleaned from debris and bigger solid particles using 200 to 50 Meshes. Using the primary stage reduces cost and time spent by saving the secondary stage cartridges from plugging so often. As the fluid exits the primary stage it enters the secondary filtration stage where it is cleaned to the desired size of solid particles 20 to 2 micron cartridges. Size of mesh or cartridge is always discussed between Gulf Energy and client engineers for optimum results and cost- efficiency. Both meshes and cartridges could be replaced during the job whenever plugged. Number of sets required depends on the cleanliness of fluid and volume to be filtered.

17.0 HIGH PRESSURE IRON

The unit will have 2 removable pipe boxes mounted on the upper deck. These boxes will provide storage and transportation for the following list of high pressure iron. The pipe boxes will have lift lugs located at each corner for hoisting onto work.

The iron will be Sour Gas service rated. The straight joints will have integral 1502 unions. The in-line flow meters are Cameron Measurement Systems turbine style meters with Fig. 1502 hammer union ends. They are made with stainless steel bodies and vanes. The 2" flow meter has a linearity of +- 1% over a flow range of 0.9 bpm to 9 bpm. The 3" flow meter has a linearity of +- 1% over flow range of 1.9 bpm to 19 bpm. Each meter has a magnetic pick up and 50ft of signal cable. The pressure transducers are Viatran brand 0 – 15,000 psi with Fig. 1502 hammer union connections and 50 ft of signal cable.





IV. Nitrogen Equipment 180K HEAT RECOVERY NITROGEN PUMPING SKID



1.0 EQUIPM ENT SPECIFICATION

The pumping unit will consist of a skid, diesel engine, self-contained liquid nitrogen pump and vaporizer system. The skid will have a steel formed channel base with fork lift slots. The nitrogen pump and vaporizer system will include a triplex liquid nitrogen pump, centrifugal charge pump, liquid nitrogen vaporizer and all necessary gauges and controls for local operation.

2.0 PERFORMANCE & PHYSICAL SPECIFICATIONS

Maximum unit design working pressure Maximum working pressure, 1.625" cold ends 10.000 PSI (69 MPa) Maximum pump flow rating Hydrostatic test pressure Maximum Envelope Dimensions: 96" (2.44 m) Width:

132" (3.35 m) Length:

107" (2.72 m) Height:

Estimated Weights: 20.000 lbs (9.072 kg)

3.0 PRINCIBLES OF OPERATION

During normal operation, liquid flows from a tank through the centrifugal charge pump (where suction pressure is boosted) to the triplex pump, where it is pressurized by reciprocating pistons to downstream pressure. The high pressure liquid then flows through the nitrogen vaporizer, absorbs a sufficient amount of heat from the power unit cooling system to raise the temperature to 60°-70° Fahrenheit (16° 21° Celsius) and flows out through the discharge valve as high pressure gas at the maximum flow rate of 180,000 SCFH To balance the heat load on the cooling system, waste system heat and heat generated by using a water brake to load the engine provide sufficient heat for nitrogen vaporization, while simultaneously insuring that heat influx to the hydraulic system and diesel engine is properly dissipated under all conditions.

Head Office; Villa 4, Al Moltaga El Araby Dist., Nozha, Heliopolis, Cairo, Egypt Tel.: +202 25172056 - 25172057 - 25172058 Fax: +202 25172054 Email: gulfenergy@genergylw.com Website: www.genergylw.com



10.000 PSI (69 MPa) 3.000 SCFM /180,000 SCFH (85 SCMM) 15.000 PSI (103 MPa)



4.0 MAJOR COMPONENT SPECIFICATIONS:

4.1 Engine

- 4.1.1 Air start lubricator, 12 CFM compressor, 60 gal air tank
- 4.1.2 Engine EDM safety shutdowns to include overheating, low oil pressure, emergency Kill
- 4.1.3 Spark arresting muffler with heat wrap from turbo to rain cap
- 4.1.4 Anti-static fan and belt
- 4.1.5 Pneumatic shutdown system, with manual emergency stop, also designed to give automatic shutdown of both intake air and fuel in the event of:
 - Engine over speed

High exhaust gas temperature

- High coolant temperature
- Low oil pressure

4.2 TRIPLEX PUMP

- 4.2.1 1.375" stroke
- 4.2.2 1.625" standard Hydra Rig cold ends

4.3 BOOST PUMP

4.3.1 Hydra Rig 1-1/2" x 1-1/2" x 6" centrifugal pump

4.4 VAPORIZER

- 4.4.1 Water bath vaporizer utilizes the power unit waste heat recovering system
- 4.4.2 A water break is used to load the engine to produce additional heat for LN₂ Vaporization

4.5 CONTROLS / GAUGES

- 4.5.1 Four channel MD/TOTCO display will be provided for discharge rate, discharge temperature, discharge pressure and total product
- 4.5.2 The control panel will include the following
 - 4.5.2.1 Engine start I stop
 - 4.5.2.2 Engine electronic data monitor
 - 4.5.2.3 Engine throttle
 - 4.5.2.4 Emergency k ill
 - 4.5.2.5 MD/TOTCO 4 channel display

4.6 PIPING

- 4.6.1 Low Pressure piping will be stainless steel and will have relief valves installed where the possibility of trapping liquid nitrogen could occur
- 4.6.2 All high pressure piping and connections will be capable of 15,000 psi working Pressure
- 4.6.3 A recirculation line will be installed to allow the triplex pump to circulate back to the tank or vented to the ground, with A 1-1/2" CGA fitting,
- 4.6.4 The triplex pump liquid discharge will have a 3/4" Autoclave recirculation valve to allow the operator to rotate the triplex pump without pressuring up the recirculation line
- 4.6.5 A 9/16" Autoclave tem ping valve and line will be installed on the unit to allow the operator to cool the discharge gas to the desired temperature. (Accessible from the control panel).
- 4.6.6 A high pressure relief will be installed on the LN2 discharge side of the triplex pump.
- 4.6.7 All high pressure fittings and valves will be autoclave or equivalent.





4.6.8 The discharge line will exit on the curb side at the rear of the skid and will incorporate a check valve C/W bleeder valve and a plug valve with a 1" 1502 WECO wing to the wellhead

	GENU-1	GENU-2
Model	Hydra-Rig	Hydra-Rig
Manufacture Year	2019	2019
Max. Injection Rate(SCF/H)	180,000	180,000
Max. Working Pressure (PSI)	10,000	10,000
Length (m)	3.4	3.4
Width (m)	2.4	2.4
Height (m)	2.54	2.54
Weight (ton)	7.86	7.86

5.0 Nitrogen Tanks

5.1 Applications

The Nitrogen Tank is used for supply, transportation and storage of cryogenic liquid nitrogen. Suitable for, nitrogen operations at any worksite on land, offshore and in remote or local areas. It can be utilized for any of Gulf Energy's specialized nitrogen services including: foam, coiled tubing operations, gas lifting, purging, leak testing, foam inerting and pipeline dewatering and dying.

Design

Strong protective frames. Drip trays fitted as standard Double valves fitted on discharge lines.

Certified for worldwide operations. All tank s fitted with relief valves and burst discs.

Design

Vacuum and pearlite double insulated.

Certified lifting sling for craneage. Fork lift pockets built into base of frame.

Access ladders form integral part of frame.

5.2 SPECIFICATION

Working Pressure: 3 bar

Service Temp.: Performance:

Hydro Test Pressure: 4.2 bar actual with vacuum in place -196°C to 50°C. Inner/ outer vessel and pipe work 0.5% Per day based on LN₂

UNIT	Length	Width	Height	Weight (Kg)
4X2000 USG LN ₂ Tanks	290	240	250	10,480
5500 Gal Tank	340	240	250	21







V. Data Acquisition

1.0 Tubing Analysis System TAS

TAS is a computer program designed to perform various calculations and simulations often needed in tubular applications. TAS is used as a coiled tubing job simulator, designing velocity strings, drill pipe applications, under-balanced drilling, cementing, and wireline simulations. TAS is an integrated modular program incorporating **Force and Stress Analysis, Fluid Circulation, and Transient Simulator,** in addition to numerous quick computations often needed in tubular computations.





Fluid Circulation Module 1.1 Data Acquisition and Real Time Processing DART

Dart is a flexible data acquisition software capable of logging data from any hardware through serial port or through Ethernet TCP/IP. DART can be used for any application where real time data is required.

1.2 Fatigue Analysis for Coiled Tubing FACT

FACT is a management tool that can be used to maximize the safe use of coiled tubing strings. The Fatigue Analysis, tracks life consumption of individual coiled tubing strings and parts of the strings subject to the jobs carried out in wells or in the yard, showing consumption per job.







