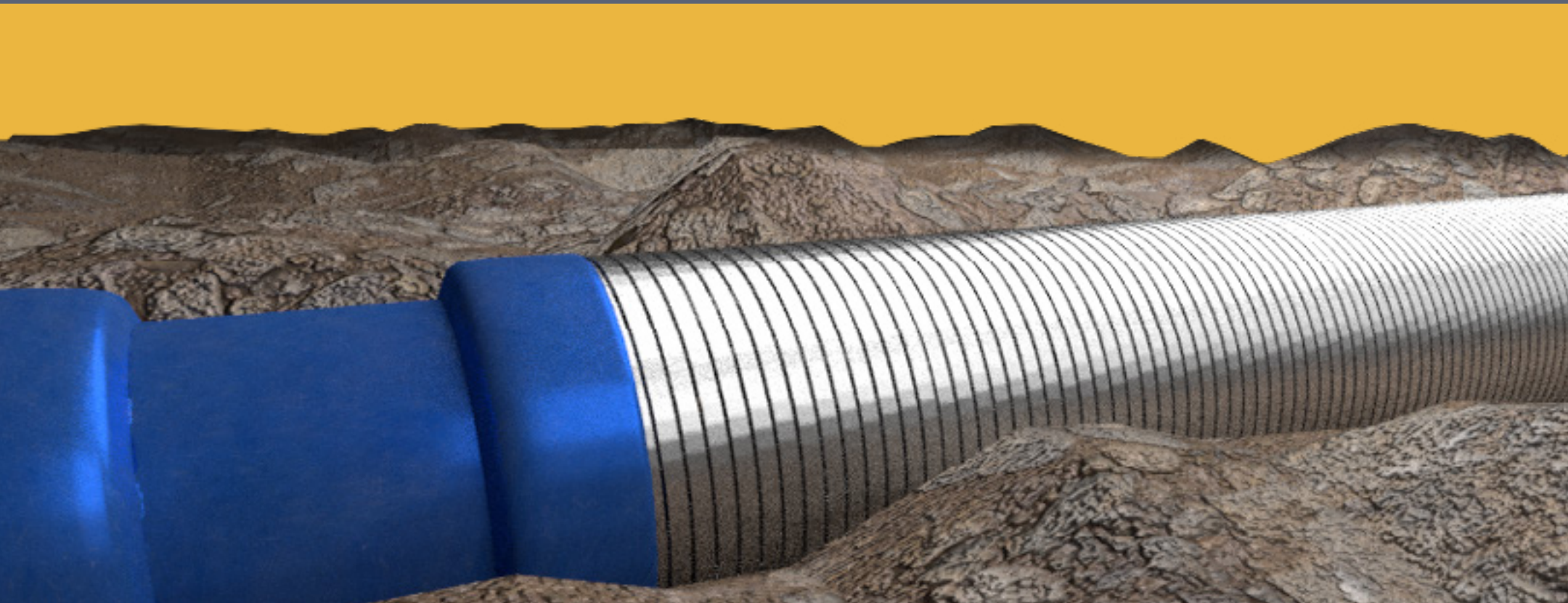
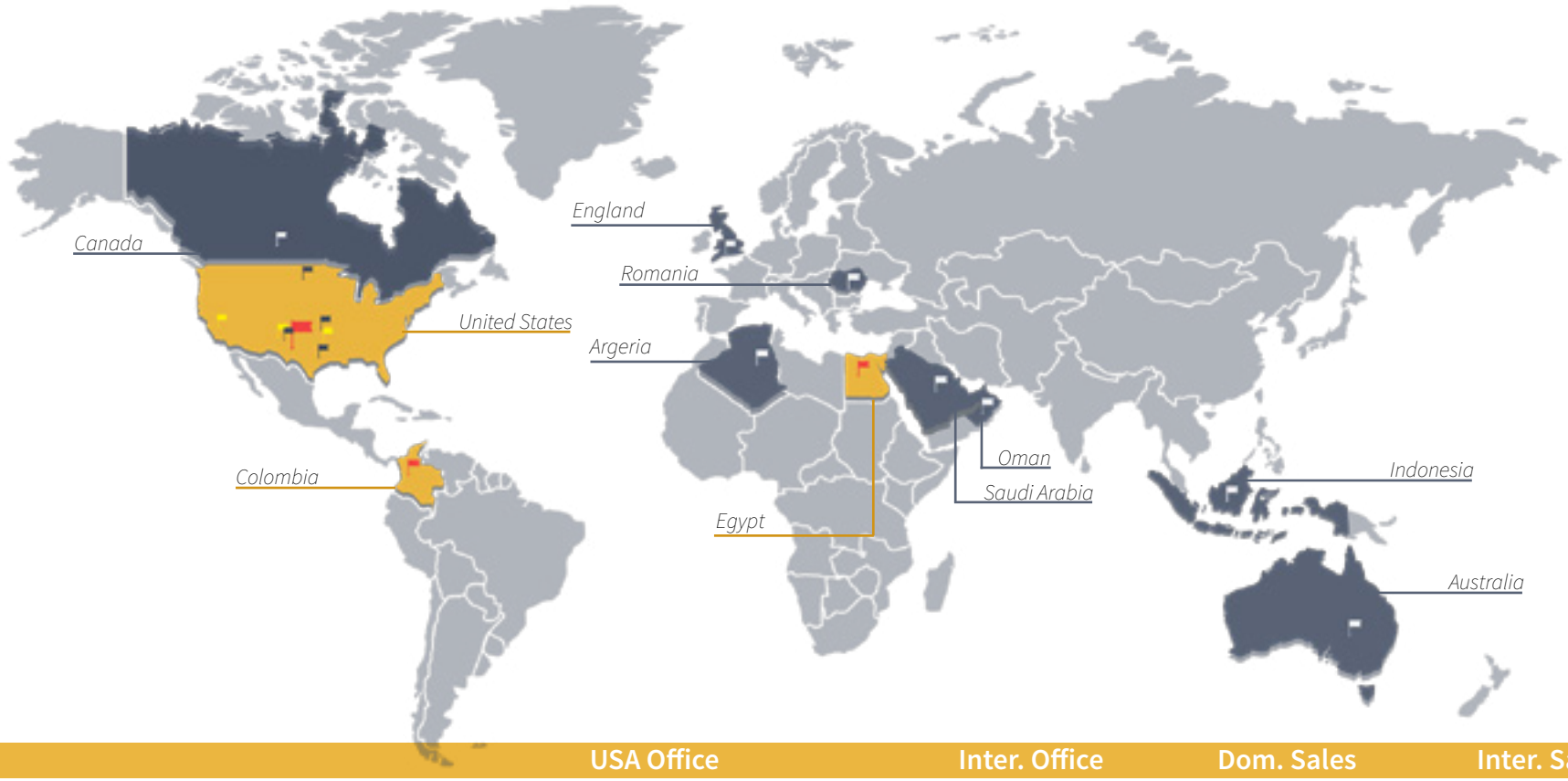
# Fluid Conditioning Systems

***Maximizing production performance with integrated artificial lift solutions.***



*Odessa Separator Inc. is a world leader in downhole fluid conditioning systems*

# Our Domestic & International Offices




| USA Office | Inter. Office | Dom. Sales | Inter. Sales |
|---|---|---|---|
| Odessa (Principal Office) | Egypt | California | Canada |
| Hobbs | Colombia | New Mexico | Indonesia |
| San Antonio | | Eagle Ford | Australia |
| North Dakota | | | Algeria |
| Oklahoma | | | Oman |
| | | | England |
| | | | Saudi Arabia |
| | | | Romania |

*Office: (432)-580-7111 | www.odessaseparator.com*

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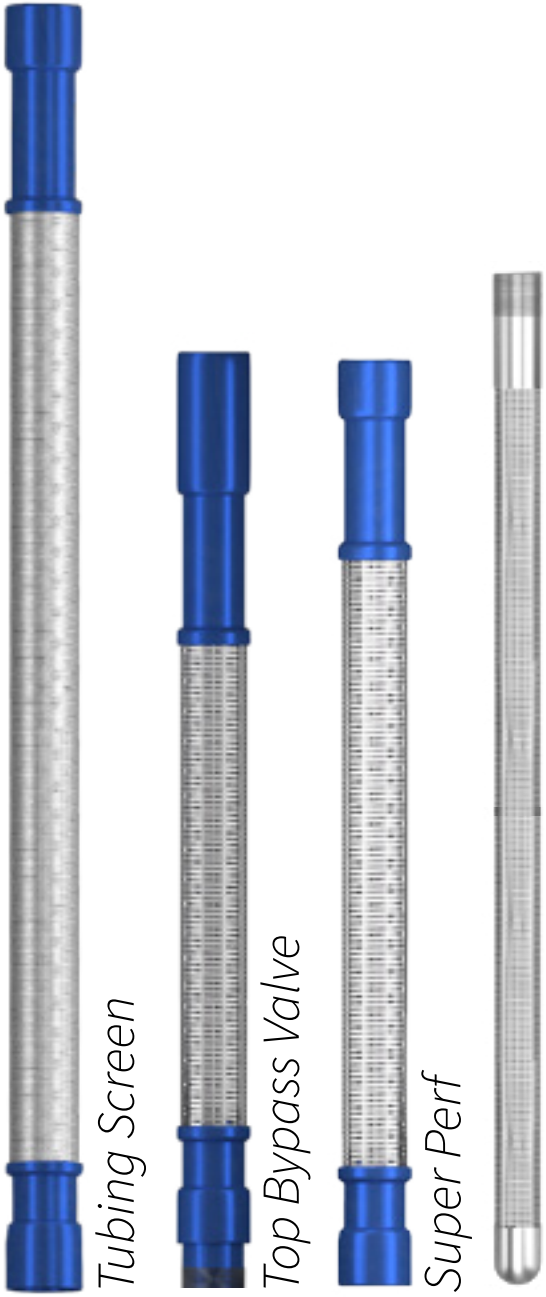
# OSI Products

## Filtration / Sand Control



Tubing Screen

Top Bypass Valve

Super Perf

Pump Guard Screen

Vortex Sand Shield

## Gas Separation

Dual Flow

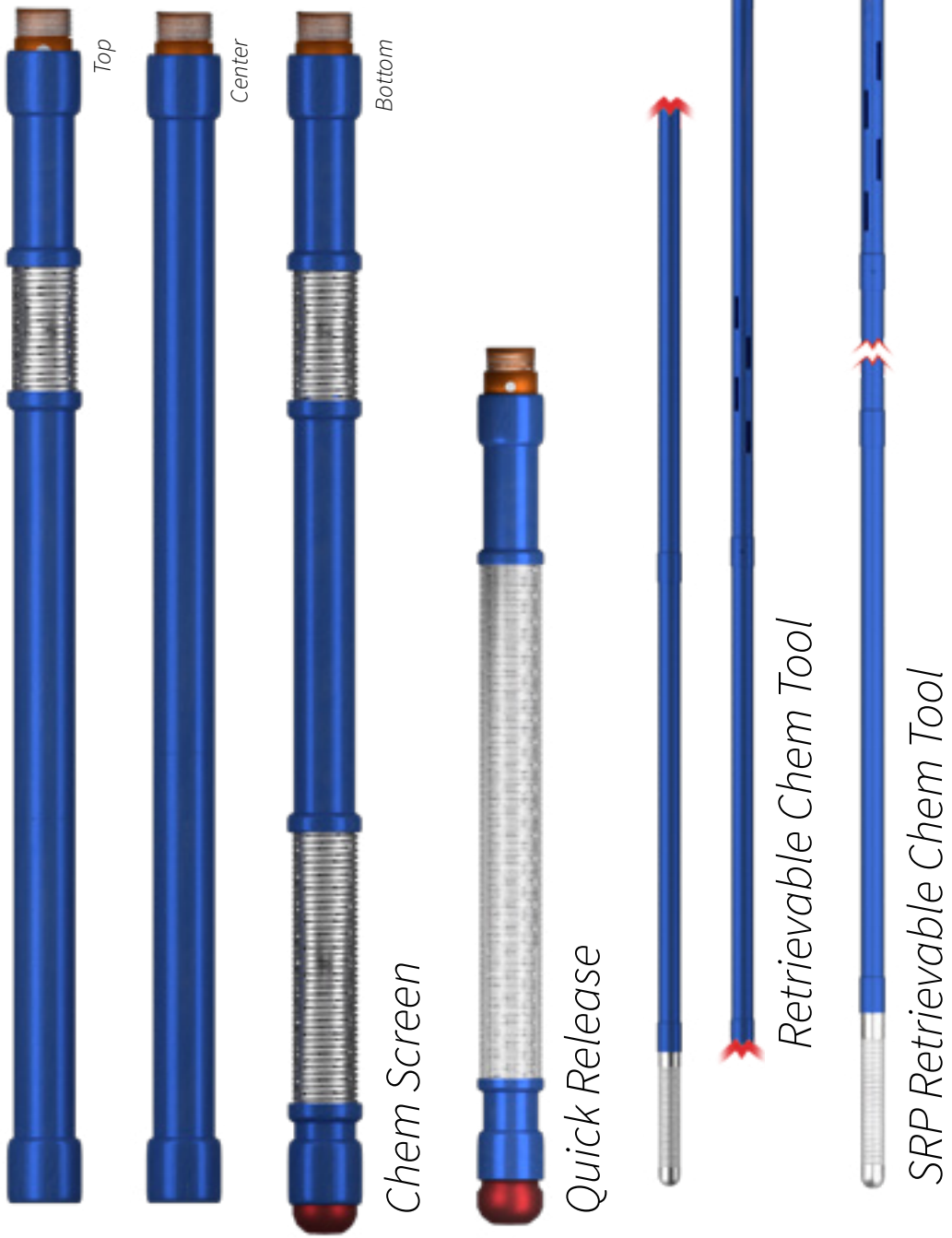
Dip Tube

Gas Separator Body

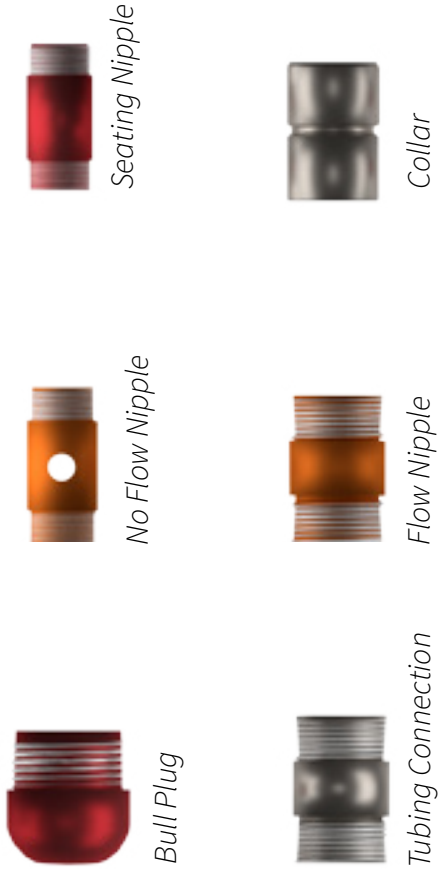
Gas Shield

Slotted Gas Shield

# Chemical Tools



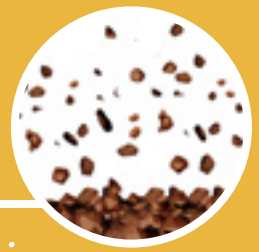

# Components




## Chemical Treatement

- Paraffin, Asphaltene, Resins.
- Scale
- Corrosion
- Defoamer
- Silver Bullet
- Biocide Applications

# Oilfield Challenges *SAND*

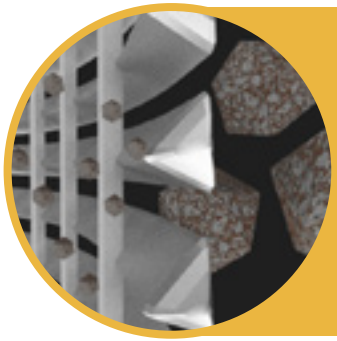


*Sand in the well damages downhole hardware and restricts efficient fluid pumping operations.*

## *FAMILIARITY WITH TYPES OF SAND*

*- Formation sand is generally smaller and irregular in size compared to other sand.*
*- Frac sand is comparably larger, very uniform in size, and more abrasive.*

| *Slot Size* | *Description* | *Plugging Potencial* |
|---|---|---|
| 0.006 - 0.008 | Fine Formation Sand | High |
| 0.012 | Med Formation Sand and 20-40 Frac Sand | Medium |
| 0.015 | Large Formation Sand and 16-30 Frac Sand | Medium |
| 0.018 - 0.020 | Small Trash & 12-20 Frac Sand | Low |
| 0.025 - 0.035 | Med Trash - No Sand | Medium |
| 0.050 | Large Trash - No Sand - Large Iron Particles | Medium |
| 0.075 | Large Trash - No Sand - Large Iron Particles | Low |



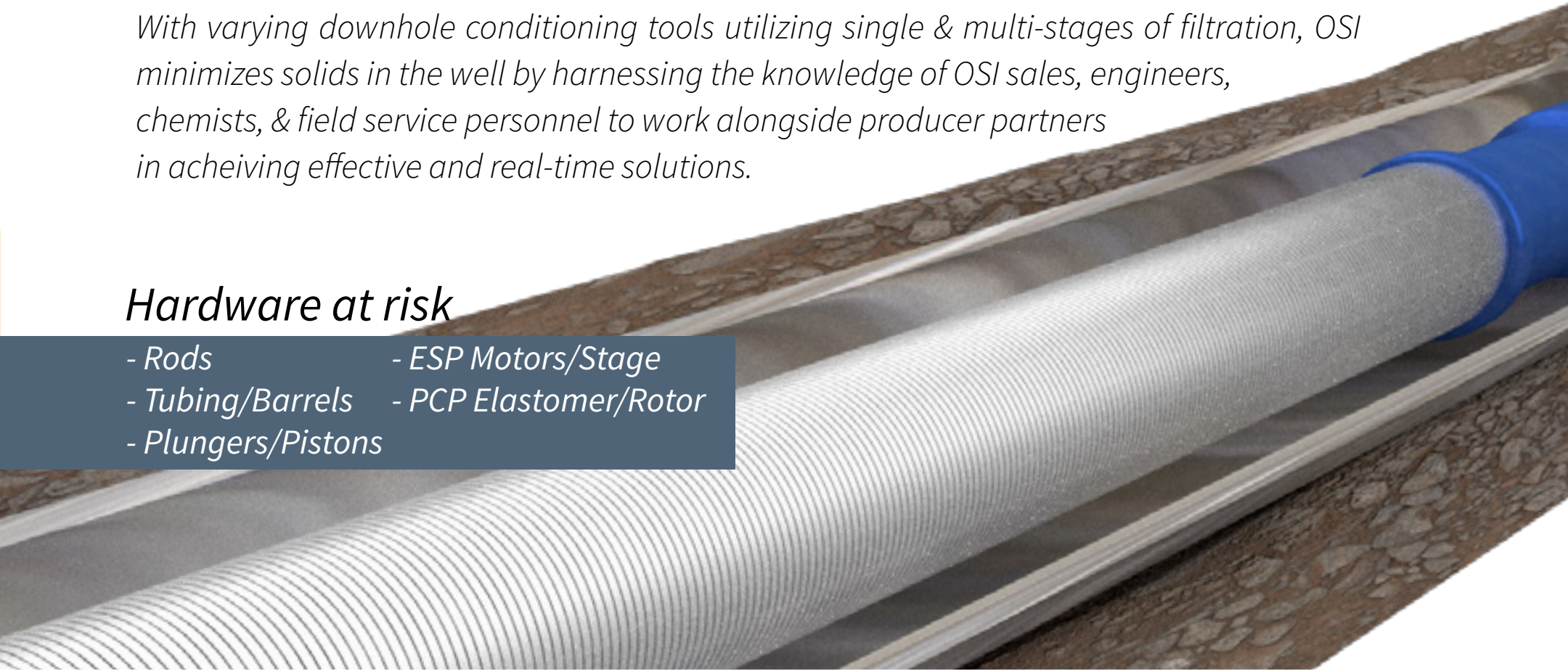
*Slot size is the opening between the V-wires. This space between indicates filtration size and type.*

*It is not uncommon for tubing screens to plug when the OSI APPROACH is neglected. OSI conducts solids and sieve well analysis to properly size slots, tool lengths, & stages of filtration for maximum pump operations.*

# OSI understands solids in the well can hinder efficient pumping operations.

## OSI APPROACH

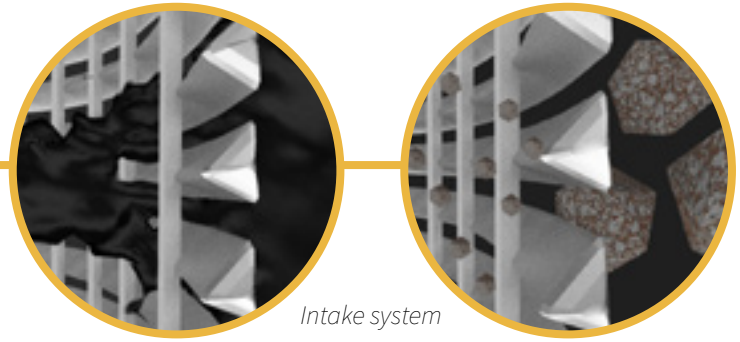
*With varying downhole conditioning tools utilizing single & multi-stages of filtration, OSI minimizes solids in the well by harnessing the knowledge of OSI sales, engineers, chemists, & field service personnel to work alongside producer partners in acheiving effective and real-time solutions.*



### Hardware at risk

- Rods
- Tubing/Barrels
- Plungers/Pistons
- ESP Motors/Stage
- PCP Elastomer/Rotor

# TUBING SCREEN



*Intake system*

The Tubing Screen is a multifunctional system designed to extend the run life of the artificial lift systems through the management and homogenization of the sand production in downhole.
This innovative system uses a V-shaped mesh design that allows the separation of abrasive solids while maximizing the open area to flow fluid. This operational advantage makes the Tubing Screen one of the best options against the abrasive effects of sand.

The size and length of system for sand management in downhole is designed based on the production and mechanical conditions of each well.

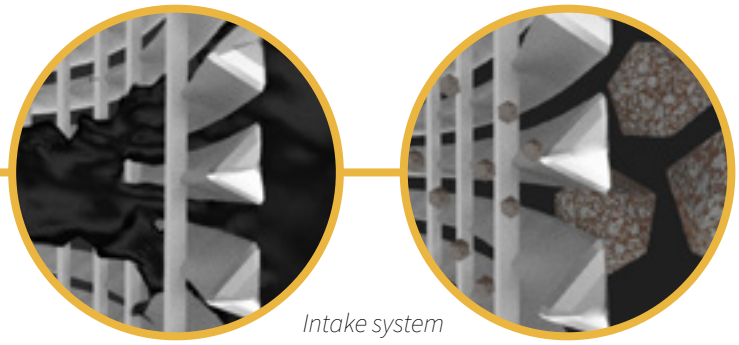
*BENEFITS*

- *Homogenizes sand slugs extending the run life*
- *Reduction in the number of interventions*
- *Decrease in non-productive time*
- *Reduces sand failure.*
- *Large intake area, reducing pressure drop.*
- *"V" shaped design provides a small contact area, reduces flow friction.*
- *A wide range of filtration slot sizes.*
- *Corrosion resistant screen.*

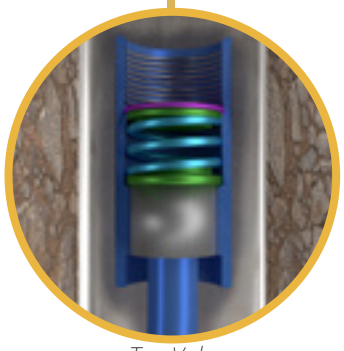
*Odessa Separator's Tubing Screens are used for maximizing artificial lift run life by separating the harmful abrasives.*

# TOP BYPASS VALVE

*Top Bypass Valve™* ***Patented***



*Intake system*



*Top Valve*



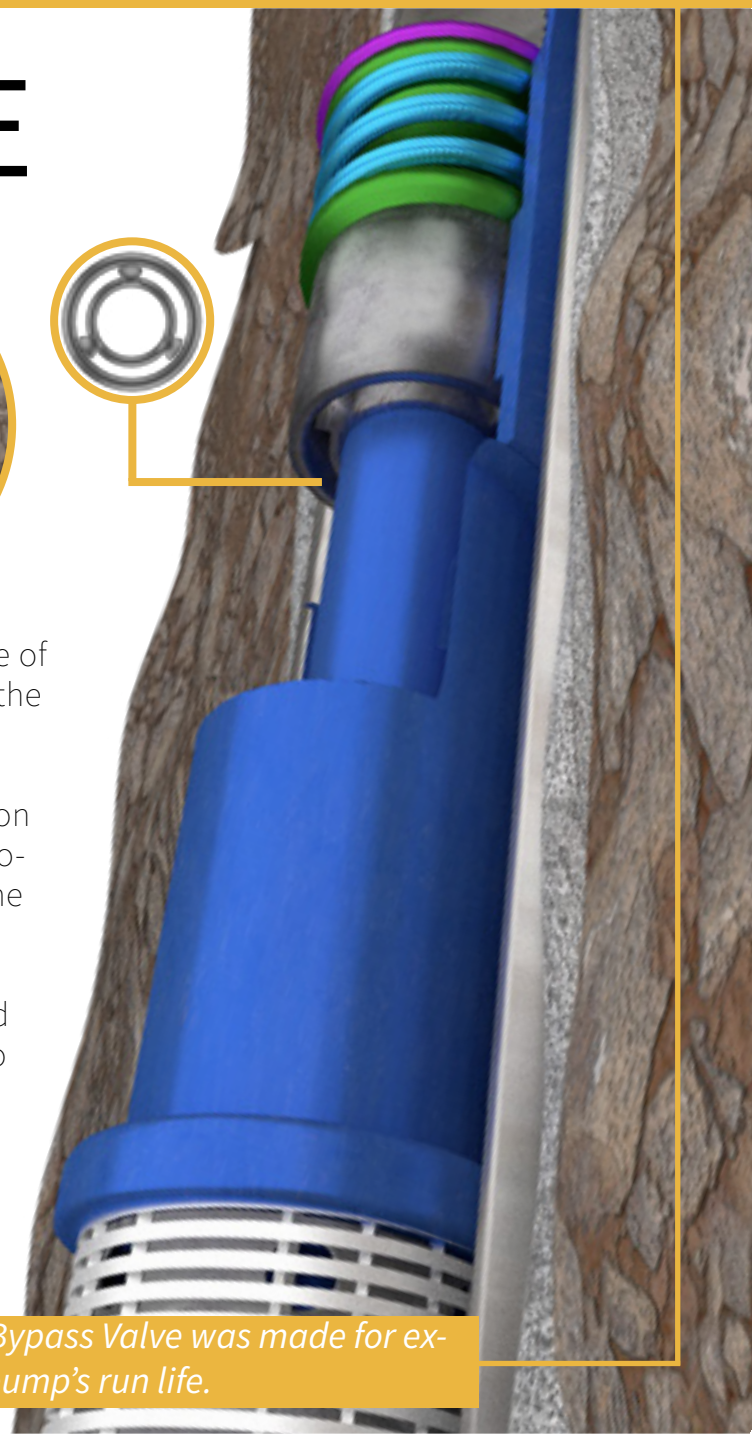
The Tubing Screen is a multifunctional system designed to extend the run life of the artificial lift systems through the management and homogenization of the sand production in downhole.

This innovative system uses a V-shaped mesh design that allows the separation of abrasive solids while maximizing the open area to flow fluid. This operational advantage makes the Tubing Screen one of the best options against the abrasive effects of sand.

The size and length of system for sand management in downhole is designed based on the production and mechanical conditions of each well in order to achieve the best performance.

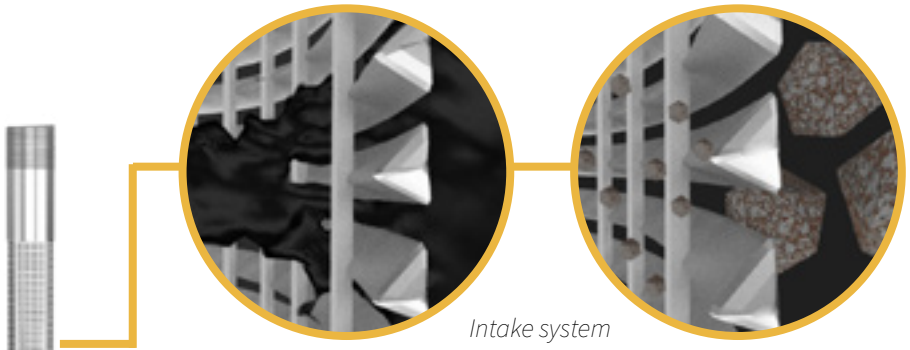
*BENEFITS*

*- Minimizes effects of plugging issues*
*- Reduces the risk of production loss*
*- Extend equipment run life.*
*- Large particle filtration.*
*- Valve is replaceable.*



*Odessa Separator's Top Bypass Valve was made for extending pump's run life.*

# PUMP GUARD SCREEN ™



*Intake system*

PUMP GUARD SCREEN is a V-wire screen spirally wound onto an internal framework of longitudinal ribs.

The outer wrap wire and ribs are made of high resistance stainless steel, precise electric Resistance welding provides high strength to the joint.

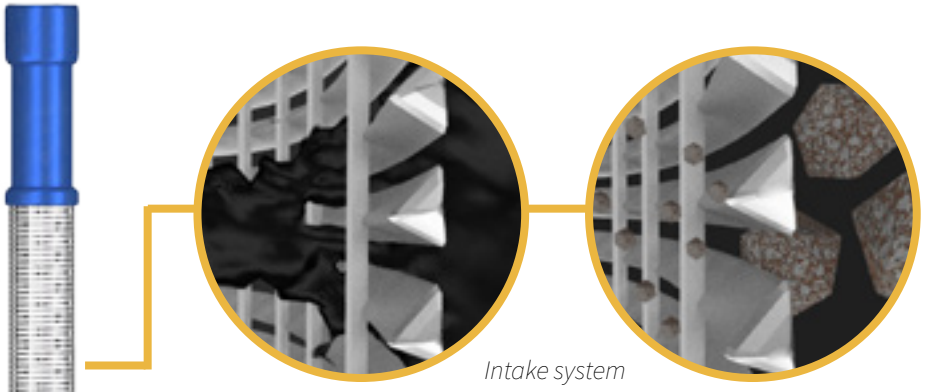
The easy and quick installation makes the Pump Guard the best option for the control of solids incurring low installation costs.

*BENEFITS*

- *Low cost solution to sand problems*
- *Rigless installation*
- *Effective sand control.*
- *Reduces potential pump damage and maintenance cost.*
- *Clogging resistant slot design.*
- *The geometric shape provides large percentage open area.*
- *Stainless steel material for corrosive applications.*
- *Available in a large selection of length and slot sizes.*

*Odessa Separator's Pump Guard Screen conditions the fluid prior to pump intake*

# SUPER PERF ™



*Intake system*

Super Perf is a high efficiency system to homogenize the sand slugs coming from the formation and allow a better sand management in downhole.

It is composed of a large opening mesh with 27 times the open area of a traditional perforated joint.

Super Perf is compatible with Any artificial lift system and its use is a complete innovation for the oil industry.

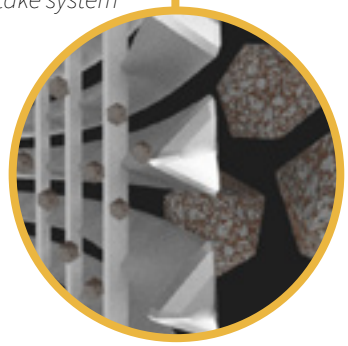
*BENEFITS*

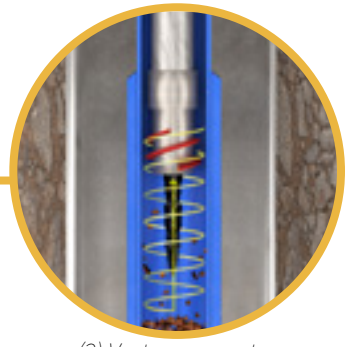
- *Improves sand management*
- *Homogenizes sand slugs*
- *Reduces failures due to large particles.*
- *Large intake area reduces pressure drop.*
- *(V) Shaped design provides a small contact area, reduces flow friction.*
- *Corrosion resistant screen.*
- *Strong pipe base design.*

*Odessa Separator's Super Perf was made to replace the perforated pup joint to improve filtration*

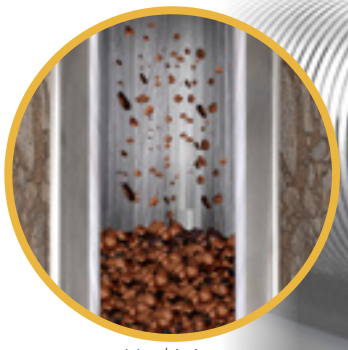
# VORTEX SAND SHIELD ™


(1) Intake system





(2) Vortex separator



Mud joint

Vortex Sand Shield is designed especially for wells with high lifting costs associated with sand problems. The use of centrifugal force to separate sand particles makes their success in applications absolute. To improve separation efficiency, the Vortex Sand Shield technology is combined with the Tubing Screen or the Super Perf to obtain a 2 stage solid separation system that has been successfully applied in multiple wells worldwide.

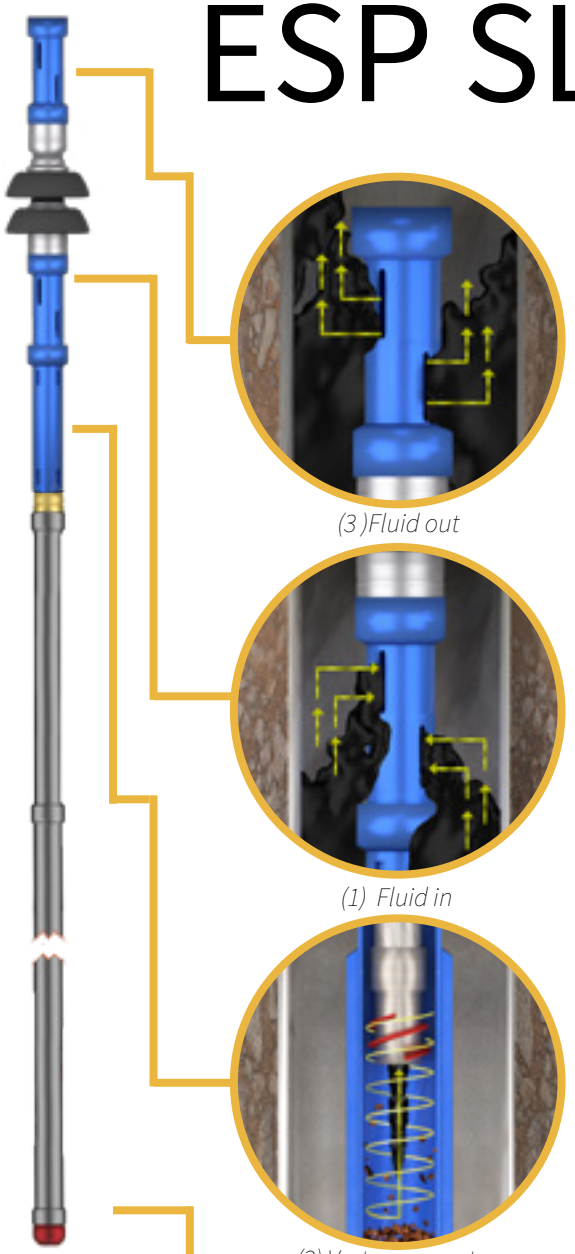
The versatility of this system allows to combine it with OSI tools for the control of solids and gas separation and create a complete and efficient optimization system that improves the performance of the lifting systems.

*BENEFITS*

- *Total elimination of sand problems*
- *Two filtration stages*
- *Maximum efficiency of solid control: Large and fine solids separation*
- *Easy installation design, less operating time.*

*Odessa Separator's Vortex Sand Shield maximizes artificial lift run life by separating harmful abrasives.*

# ESP SLOTTED VORTEX ™



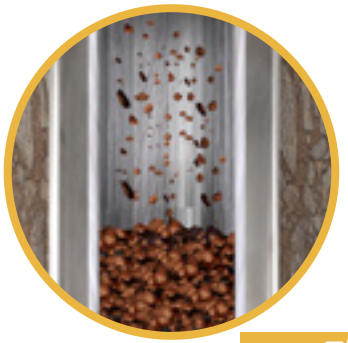

The intake consists of a specifically engineered slotted design. These slots are cut using a plasma cutter which creates smoother cut surfaces than other cutting methods. Smooth surfaces are less likely to be affected by corrosion.

The helix creates the vortex using centrifugal force, which separates the smaller solids and deposits them into the tail pipe[s] (mud joint[s]).

This improved version of the sand shield vortex was designed to withstand the high speed of the particles and avoid cuts in the tool and the failure of the solid separation system.

*BENEFITS*

- *Reduced the downtime due to solid issues.*
- *Less interventions and less investment in CAPEX.*
- *Stable pump parameters: Vibration, frequency, voltage and motor current.*
- *Avoid the premature failures of the pump components caused by the solids.*



*Mud joint*

*The ESP Slotted Vortex consists of an intake and an embodied helix (vortex creator)*

# Oilfield Challenges *GAS*

*When gas is not properly conditioned down in the well, it begins to occupy space in the pump that prohibits efficient pump production. As a consequence, equipment failure ensues from gas interference leading to gas pounding or gas lock.*

## *Hardware at risk*

- *Rods Failure*
- *Tubing Failure*
- *ESP Seals / Stages*
- *PCP Elastomer/Rotor*
- *ESP Valves / Guides*

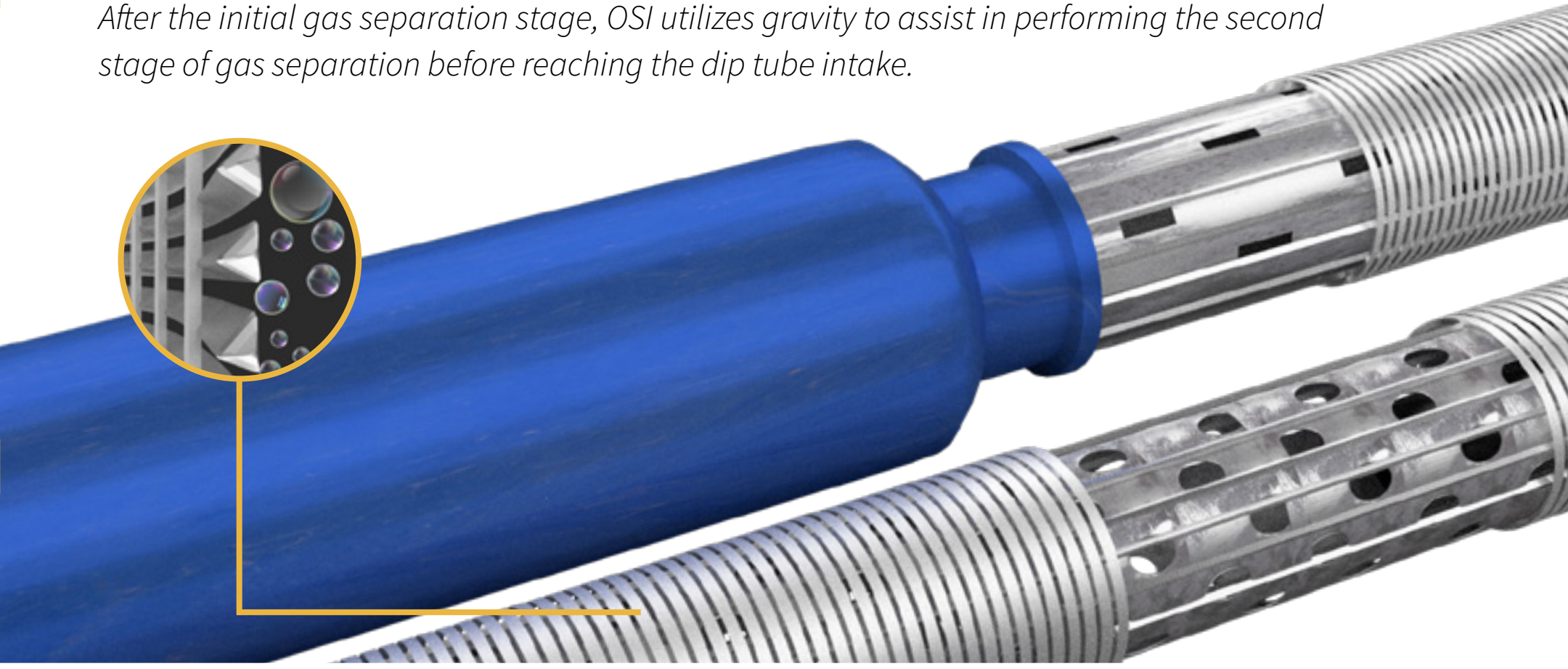
## *OSI APPROACH*

*Using a variety of downhole conditioning tools utilizing single & multi stages of separation & filtration, OSI minimizes gas & solids in the well by harnessing the knowledge of OSI sales, engineers, chemists, & field service personnel to work with producer partners to achieve effective and real time solutions.*

# Different Stages of Gas Separation

*OSI gas separation units create a pressure drop for breaking out solution gas in the first stages of intake.*

*After the initial gas separation stage, OSI utilizes gravity to assist in performing the second stage of gas separation before reaching the dip tube intake.*



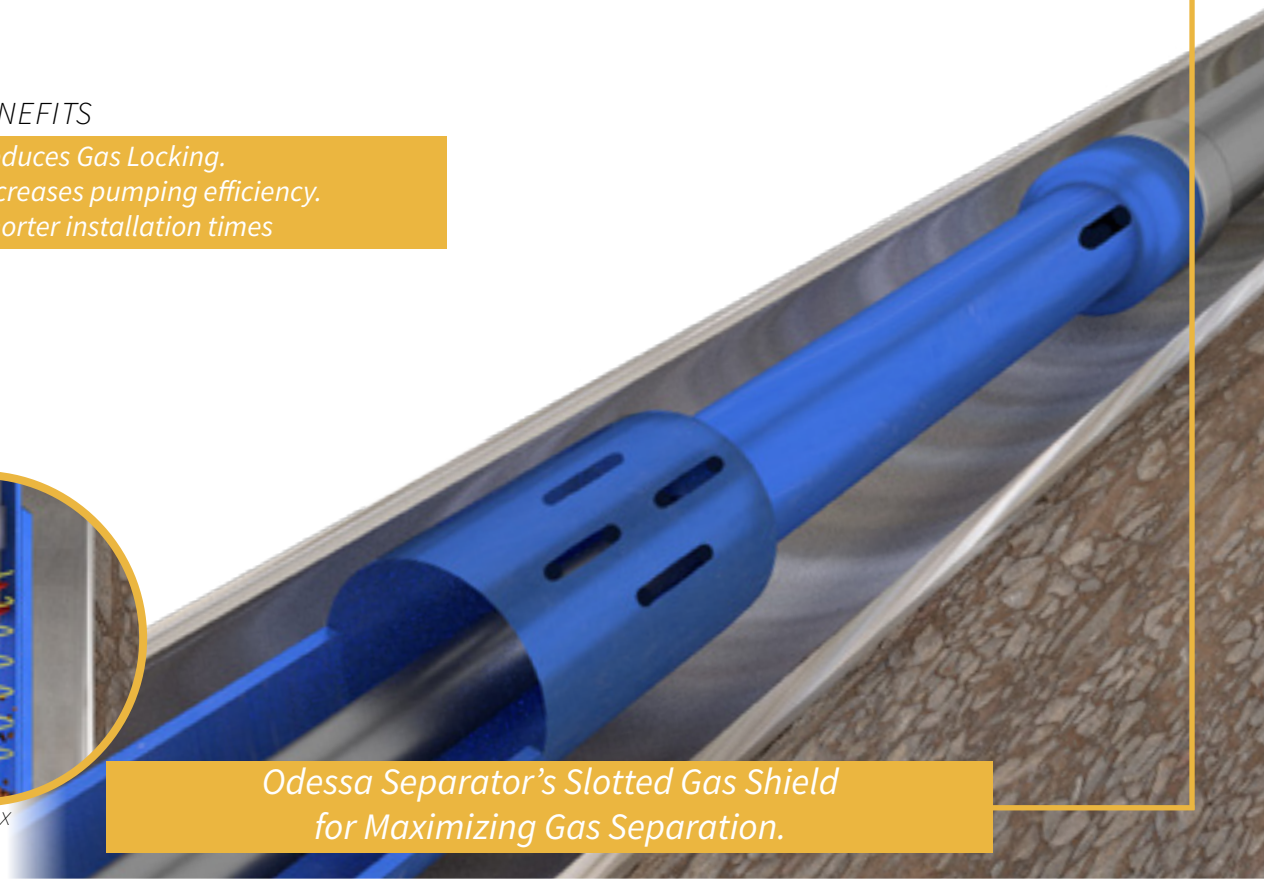
# SLOTTED GAS SHIELD ™


Slotted Gas Shield is a modified gas separator with a speed reducing ring that increases gas separation efficiency by delivering gas free fluid to the pump.

Compared to other downhole gas separators, due to the patented Dual Flow SystemTM, installation times and operating efficiencies are much greater.

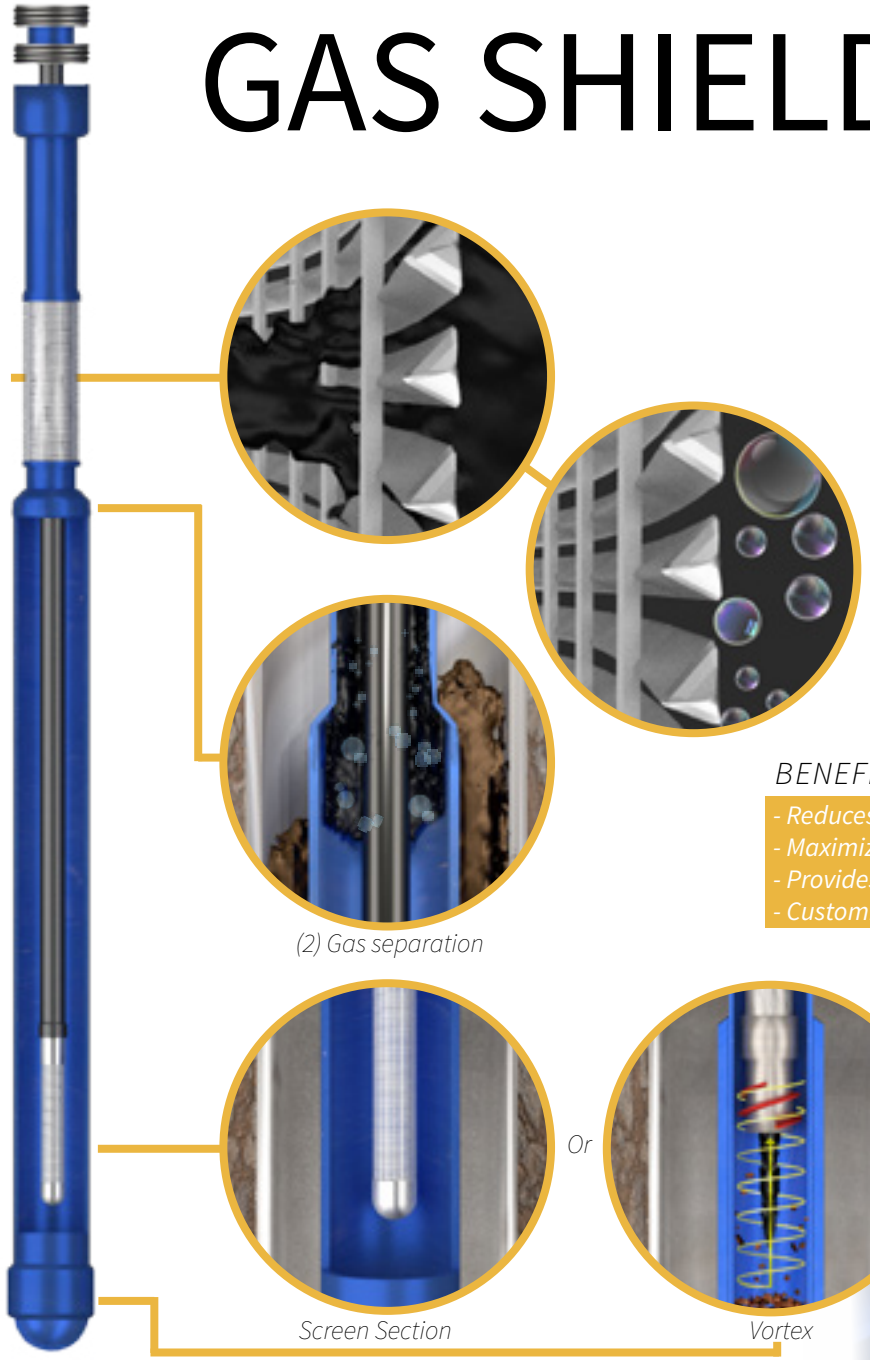
*BENEFITS*

- *Reduces Gas Locking.*
- *Increases pumping efficiency.*
- *Shorter installation times*



*Odessa Separator's Slotted Gas Shield for Maximizing Gas Separation.*

# GAS SHIELD ™



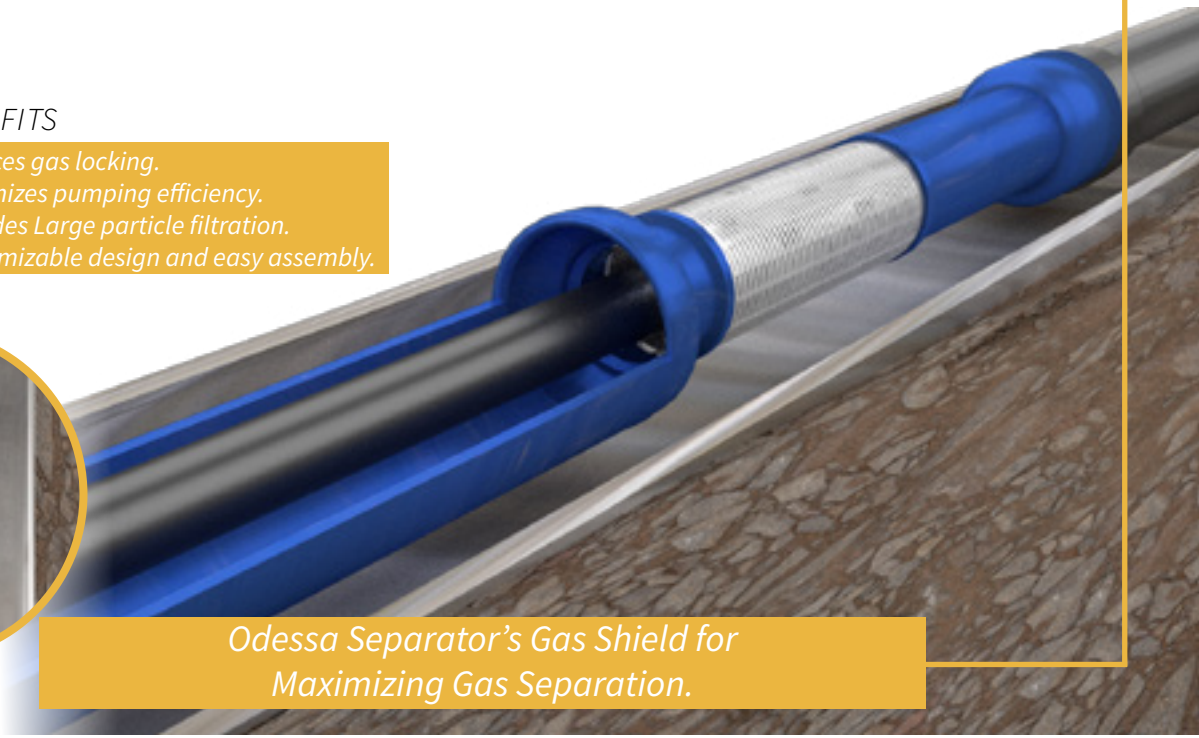

Gas Shield is a great innovation of the modified poor boy gas separator.

Through the incorporation of a mesh in the neck of the separator and a larger diameter body, a greater effect of coalescence of the gas bubbles and a greater efficiency of separation is achieved.

One of the main additional benefits is the ability to separate large solids and homogenize the sand slugs. The length and diameters of the Gas Shield are designed based on the production and mechanical well conditions.

*BENEFITS*

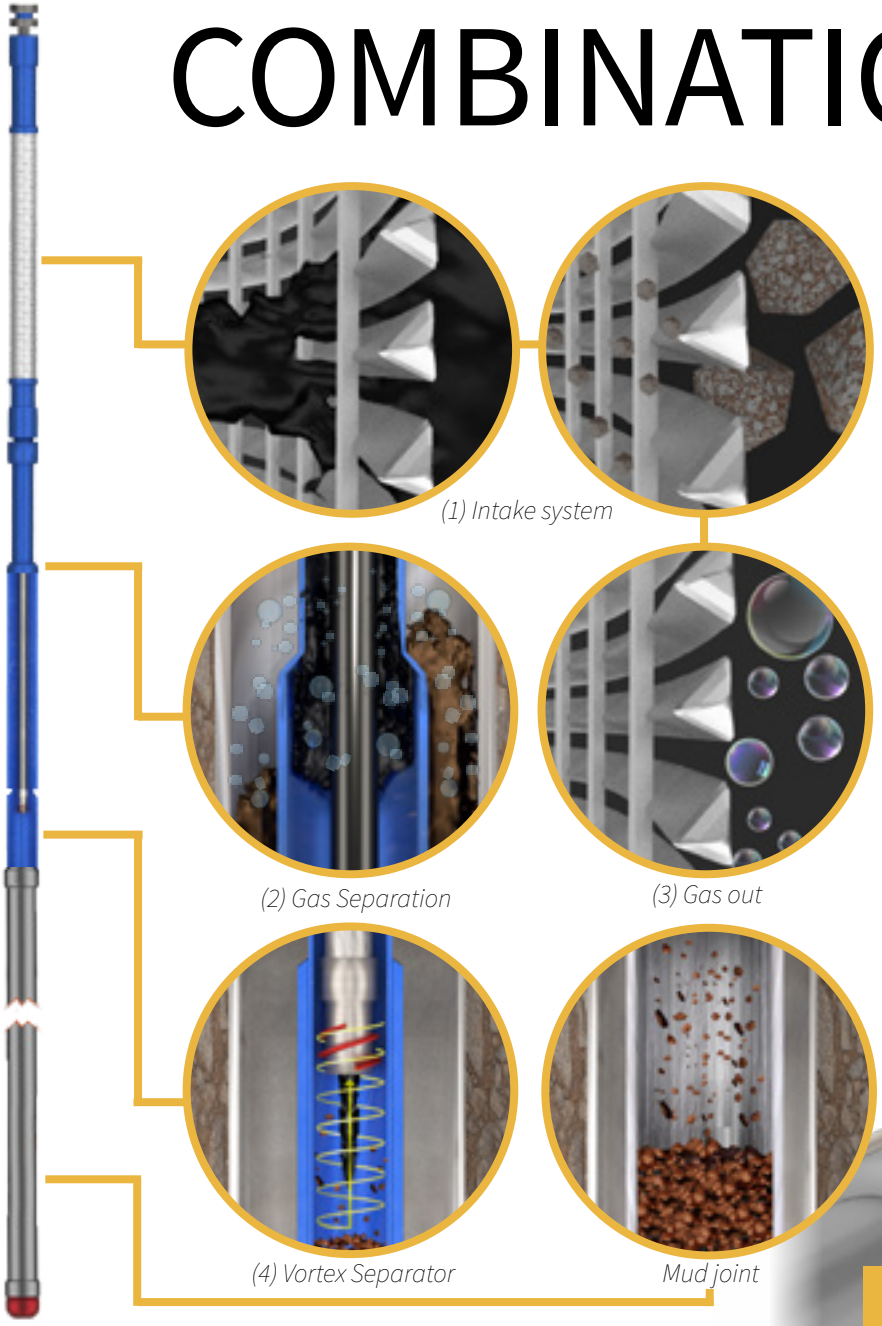
- *Reduces gas locking.*
- *Maximizes pumping efficiency.*
- *Provides Large particle filtration.*
- *Customizable design and easy assembly.*



*Odessa Separator's Gas Shield for Maximizing Gas Separation.*

# COMBINATION TOOL ™

Combination Tool ™ **Patented**

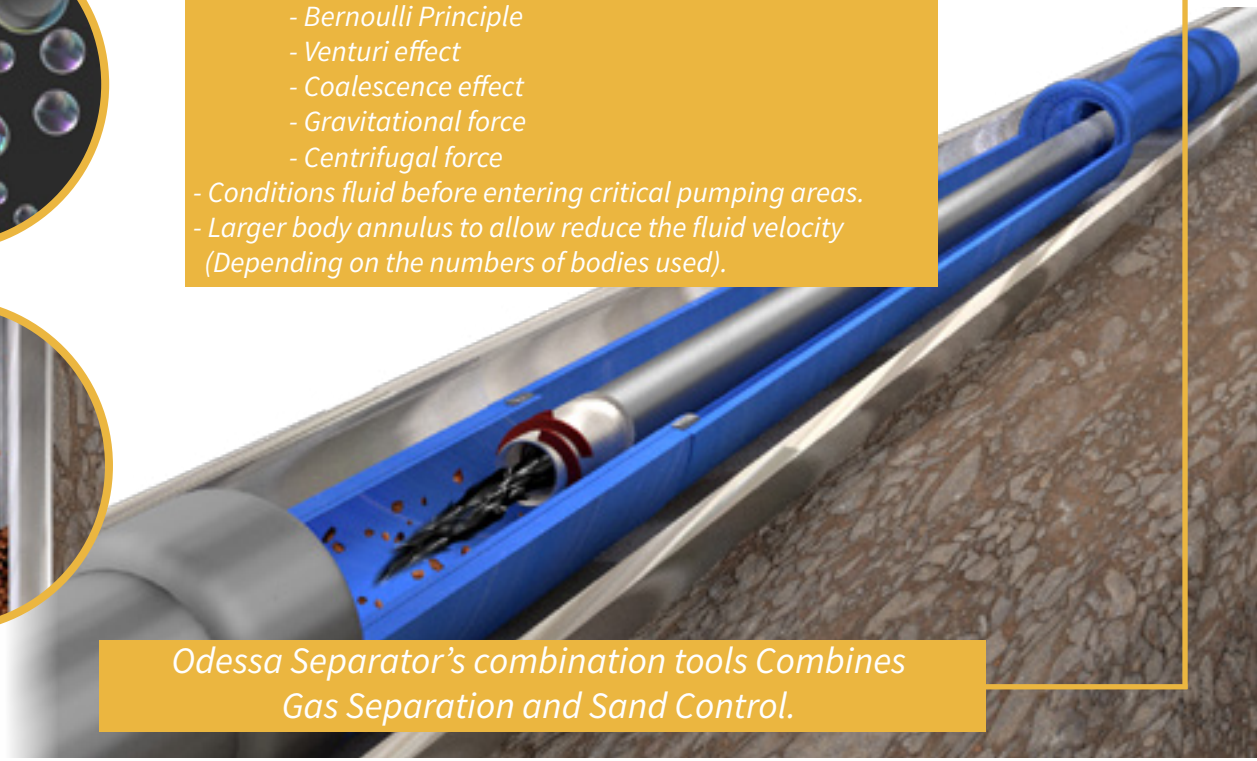



Combination Tool is the concept used by OSI to achieve the maximum optimization of the artificial lift system through the combination of different OSI tools and their operating principles.

Under this concept the conditioning of the fluid is given by the control of solids, gas and chemical deposits

*BENEFITS*

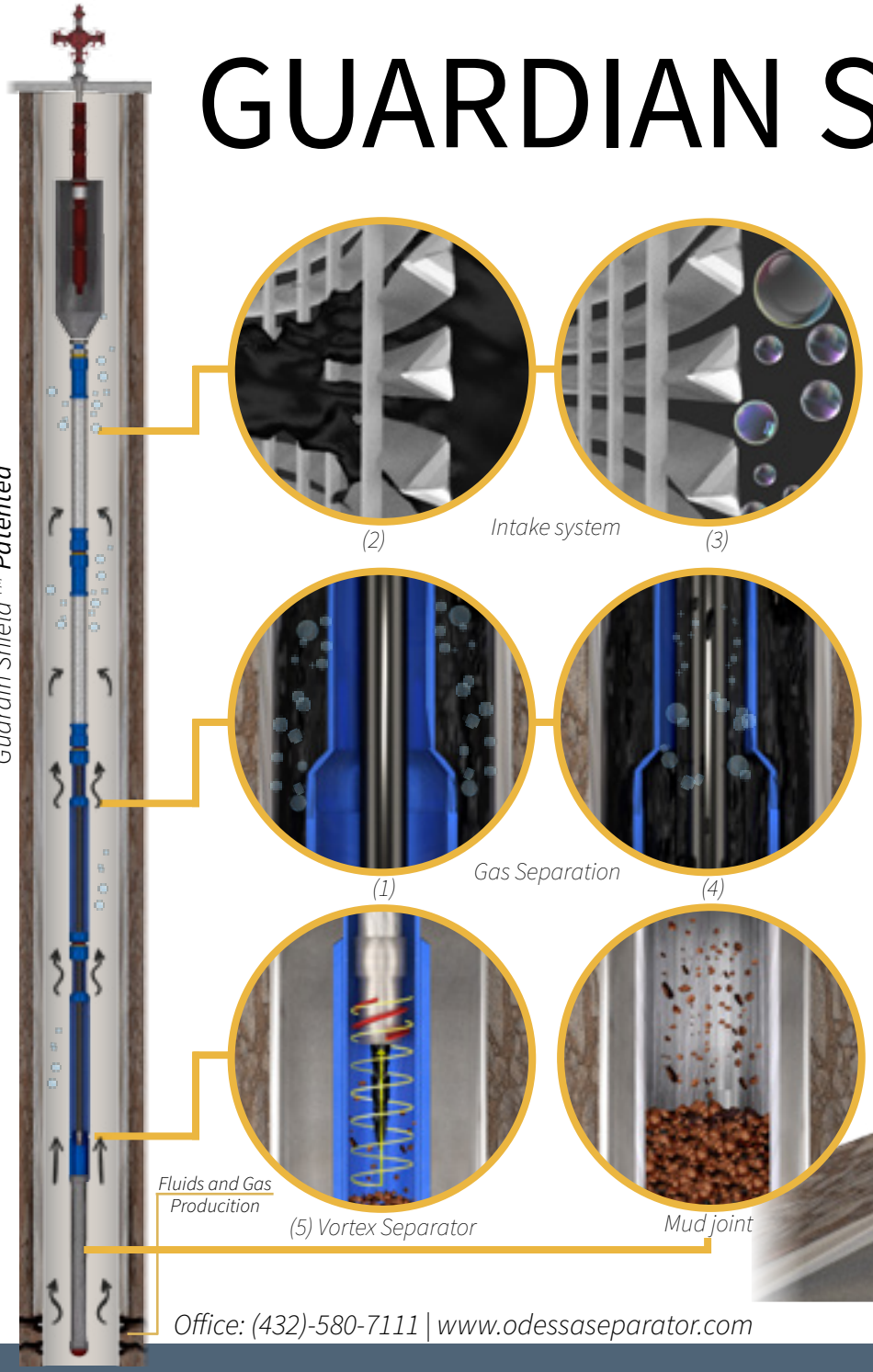
- *Combined tools for severe sand and gas problems.*
- *Multiple configurations with different principles of operation.*
  - *Bernoulli Principle*
  - *Venturi effect*
  - *Coalescence effect*
  - *Gravitational force*
  - *Centrifugal force*
- *Conditions fluid before entering critical pumping areas.*
- *Larger body annulus to allow reduce the fluid velocity (Depending on the numbers of bodies used).*



*Odessa Separator's combination tools Combines Gas Separation and Sand Control.*

# GUARDIAN SHIELD ™

Guardin Shield™ **Patented**



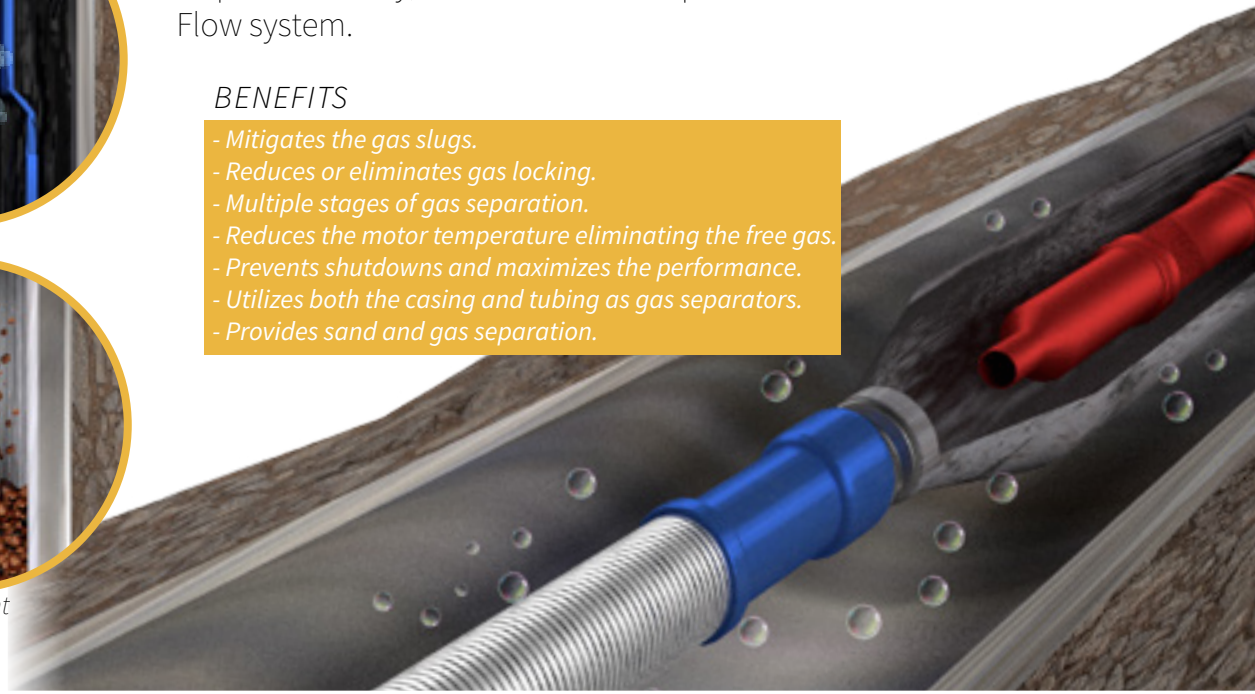

Guardian Shield is a unique system designed by OSI to overcome the challenges posed to ESPs by wells with high GLR and GOR. In many occasions, limits such as the size of the casing or the volume of fluids limit the efficiency of separation and lead to problems per gas lock.

With this new technology, OSI seeks to combine all the traditional principles of downhole gas separation with the new separation concepts to obtain a maximum separation efficiency even in systems with large operating limitations and capacity.

Guardian Shield is compatible with all types of ESPs and its installation is quick and easy, thanks to the incorporation of the Dual Flow system.

*BENEFITS*

- *Mitigates the gas slugs.*
- *Reduces or eliminates gas locking.*
- *Multiple stages of gas separation.*
- *Reduces the motor temperature eliminating the free gas.*
- *Prevents shutdowns and maximizes the performance.*
- *Utilizes both the casing and tubing as gas separators.*
- *Provides sand and gas separation.*

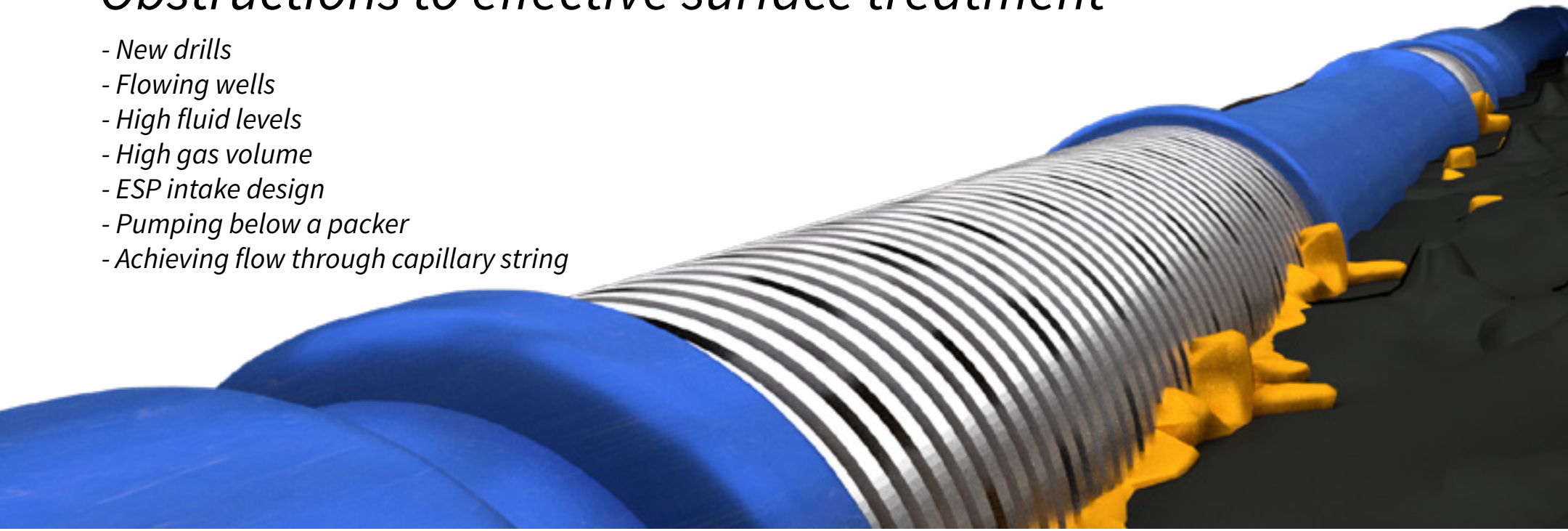


# Oilfield Challenges CHEMICAL

*Operators use downhole hardware to filter, condition, manipulate, and redirect harmful solids & gas in oil & gas wells. However, other agents of destruction downhole must be confronted with chemicals.*
*Surface chemical treatments are costly, but common practice. Treating critical hardware in pumping zones and production fluid within the tubing string can prove difficult.*

## Obstructions to effective surface treatment

- *New drills*
- *Flowing wells*
- *High fluid levels*
- *High gas volume*
- *ESP intake design*
- *Pumping below a packer*
- *Achieving flow through capillary string*



# OSI understands the lack of effective chemcial treatment programs hinder efficient pumping operations.

## OSI APPROACH

*Using a variety of laboratory testing capabilities in fluid & well analysis, OSI minimizes destructive downhole agents with targeted treatment & harnessing the knowledge of chemistry. OSI staff work with producer partners to achieve effective & on going real time solutions long after the tool is installed.*

## Hardware at risk

- Paraffin, Asphaltene, Resins.
- Scale
- Corrosion
- Defoamer
- Silver Bullet
- Biocide Applications

*Well specific formulas created for each well and tagged for post-installation residual testing to ensure a slow & steady release of chemical. OSI field personnel test for customer reporting using analytical procedures based on A.S.T.M, N.A.C.E, & A.W.W.A. published test methods.*

# CHEM STICKS ™


Designed for wells looking to inject a quick and easy chemical shock, OSI ChemSticksTM are dropped directly into the well from the surface. Corrosion, scale, parrafin, or other destructive downhole agents are now easier than ever to combat.

Based on OSI's patented microencapsulation technology, the ChemSticksTM are simple supplements to enhance chemical treatment requiring no additional costly resources.

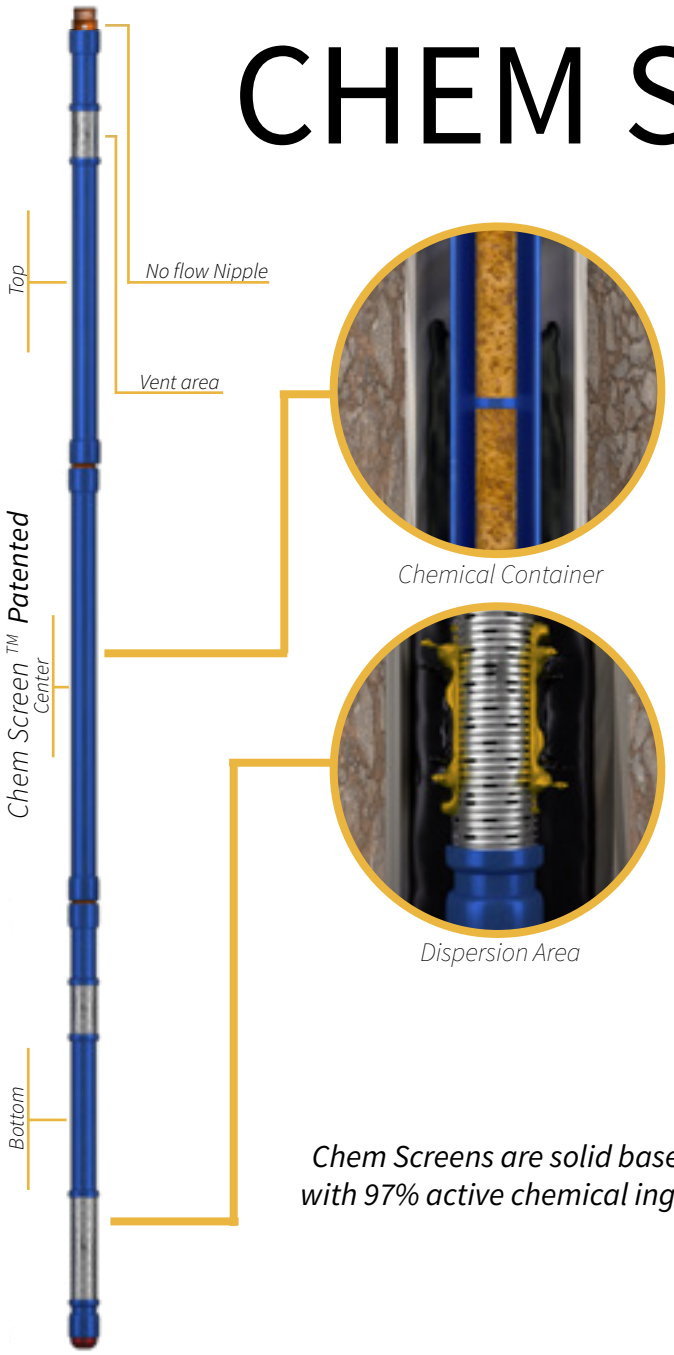
ChemSticksTM are ordered with general or well-specific formulas for any flowing well or any artificial lift well: SRP, ESP, PCP, gas lift, plunger lift, and jet pump.

*BENEFITS*

*- Well-specific prescriptions are based upon water & oil analysis.*
*- All corrosion sticks have quat + scaveger included for combatting H2S.*

*Each ChemStickTM pack has 4 sticks of well specific or general formulas comprised of inhibitors addressing corrosion, scale, parrafin, asphaltenes, foaming, & combo formulas.*

# CHEM SCREEN ™






Chemical Container



Dispersion Area

*Chem Screens are solid based blend with 97% active chemical ingredients.*

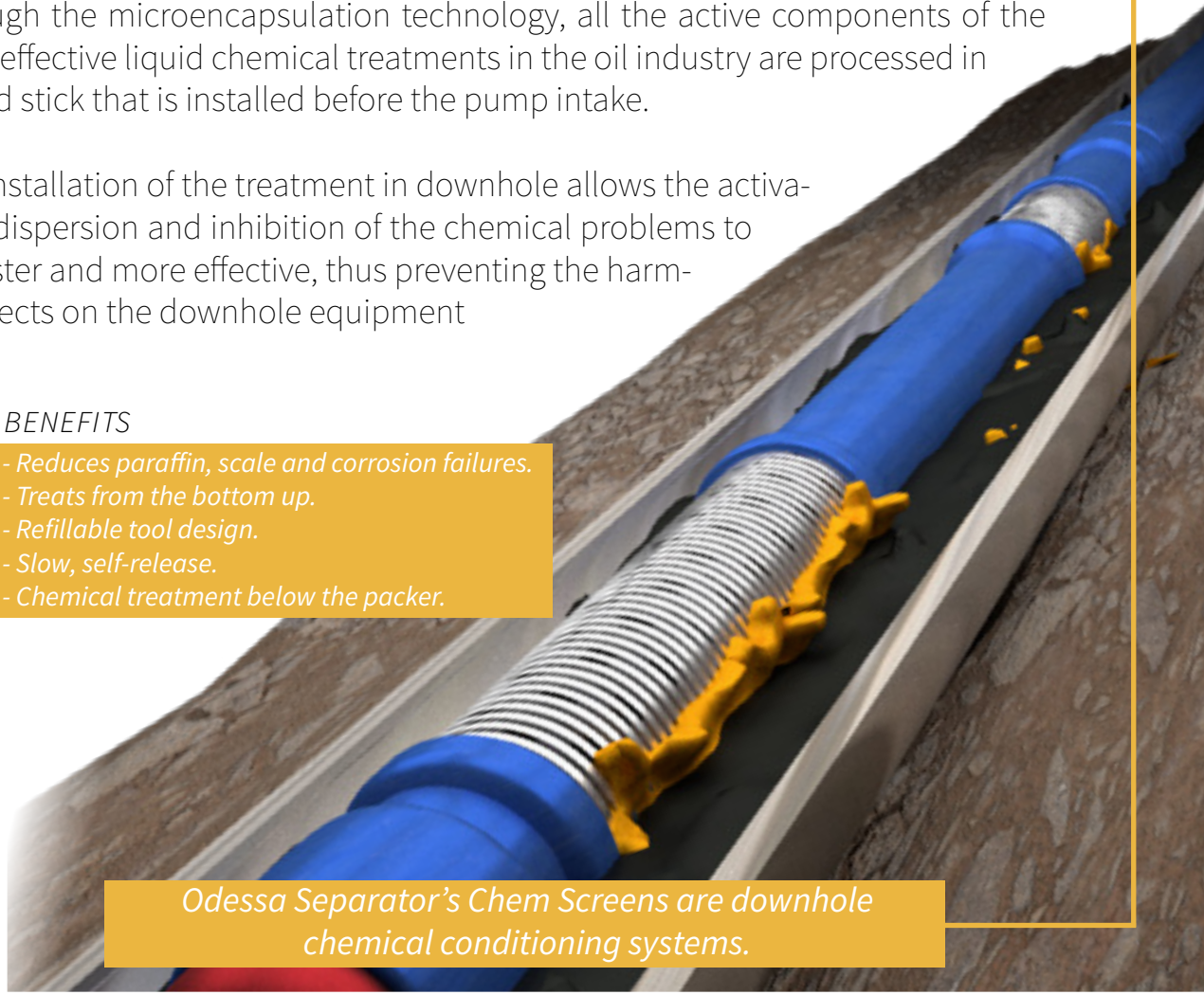
Chem Screen is a new technology that changes the traditional concept of downhole chemical treatment.

Through the microencapsulation technology, all the active components of the most effective liquid chemical treatments in the oil industry are processed in a solid stick that is installed before the pump intake.

The installation of the treatment in downhole allows the activation, dispersion and inhibition of the chemical problems to be faster and more effective, thus preventing the harmful effects on the downhole equipment

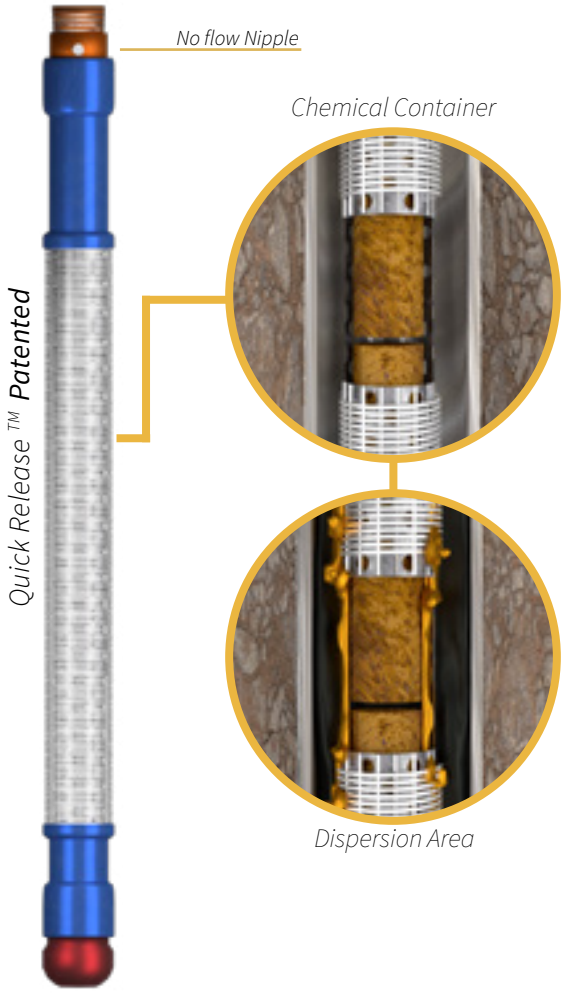
*BENEFITS*

- *Reduces paraffin, scale and corrosion failures.*
- *Treats from the bottom up.*
- *Refillable tool design.*
- *Slow, self-release.*
- *Chemical treatment below the packer.*



*Odessa Separator's Chem Screens are downhole chemical conditioning systems.*

# QUICK RELEASE ™

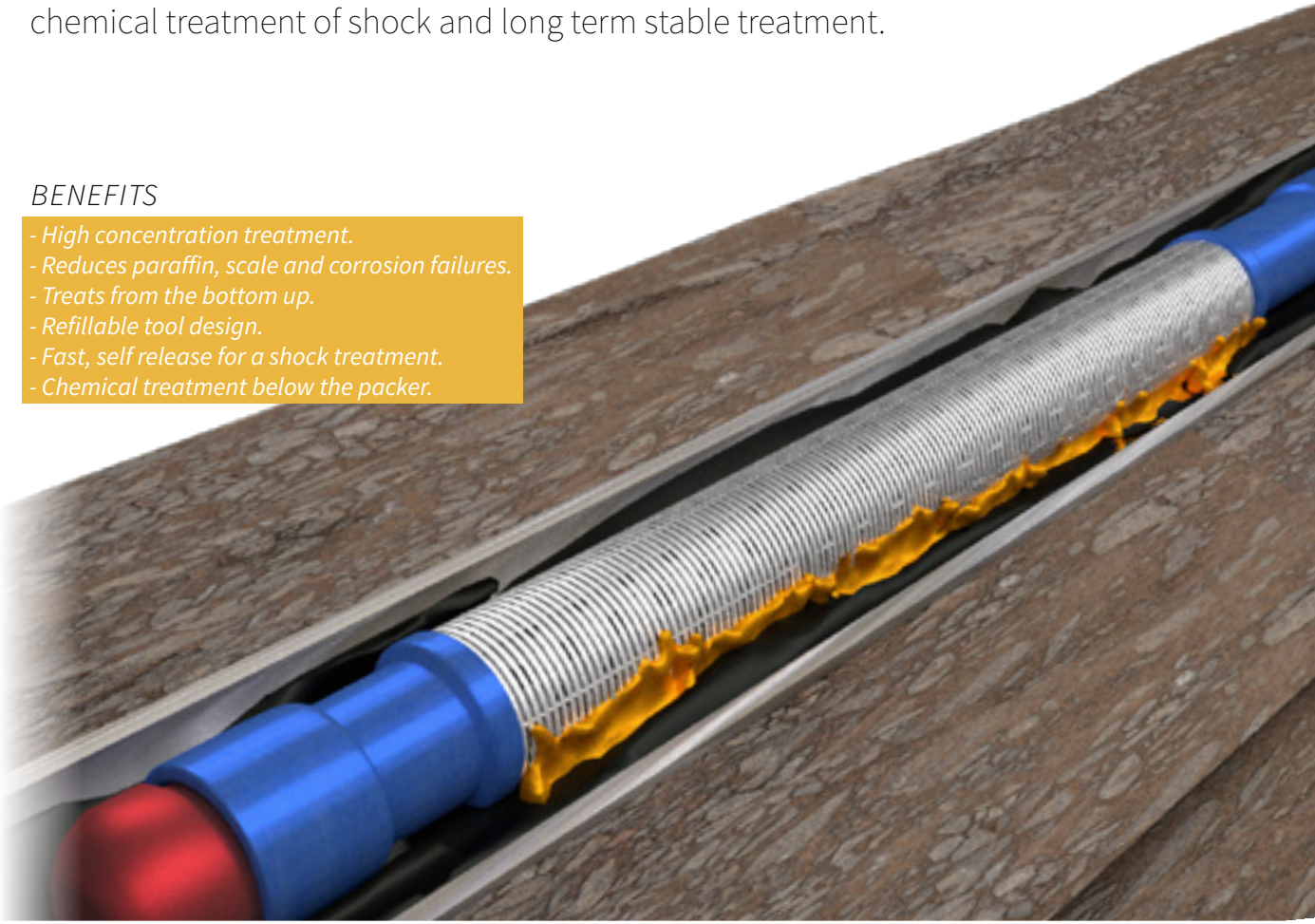



Quick release is a chemical shock treatment for wells with severe chemical problems. Its main advantage is that it treats the well from the bottom with a high concentration of chemical treatment to balance the downhole conditions of the system.

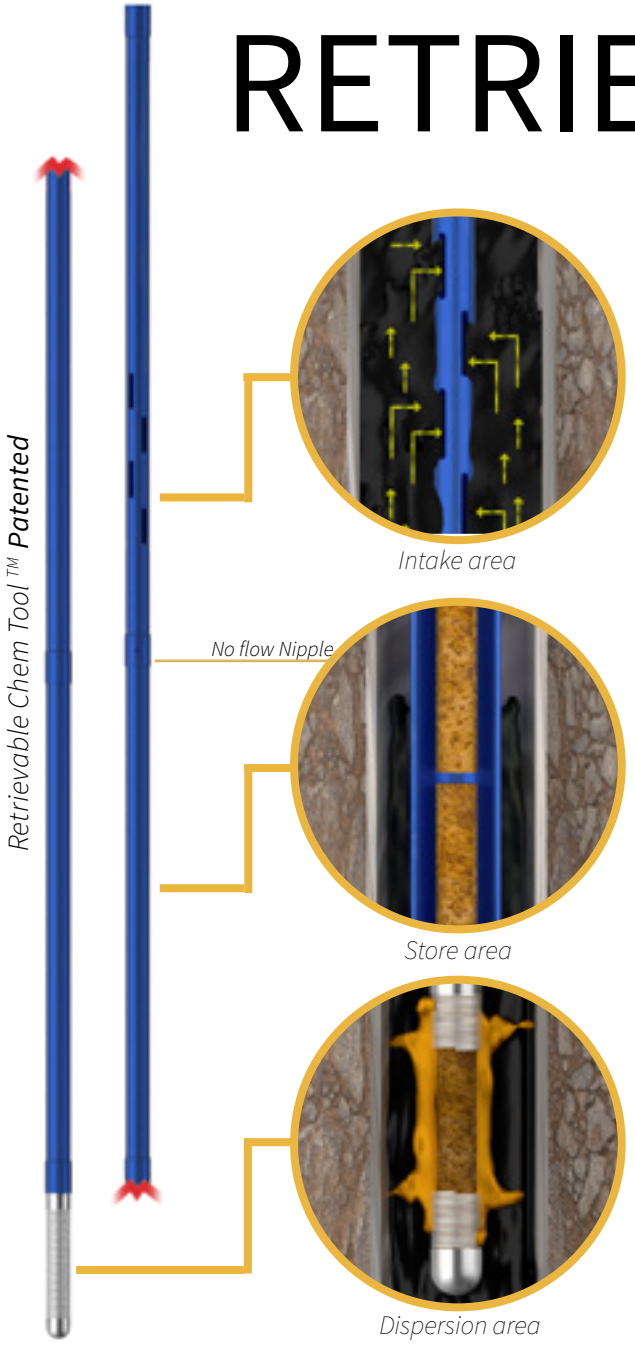
Quick Release is perfectly compatible with the Chem Screen offering a total solution, chemical treatment of shock and long term stable treatment.

*BENEFITS*

- *High concentration treatment.*
- *Reduces paraffin, scale and corrosion failures.*
- *Treats from the bottom up.*
- *Refillable tool design.*
- *Fast, self release for a shock treatment.*
- *Chemical treatment below the packer.*



# RETRIEVABLE CHEM TOOL ™



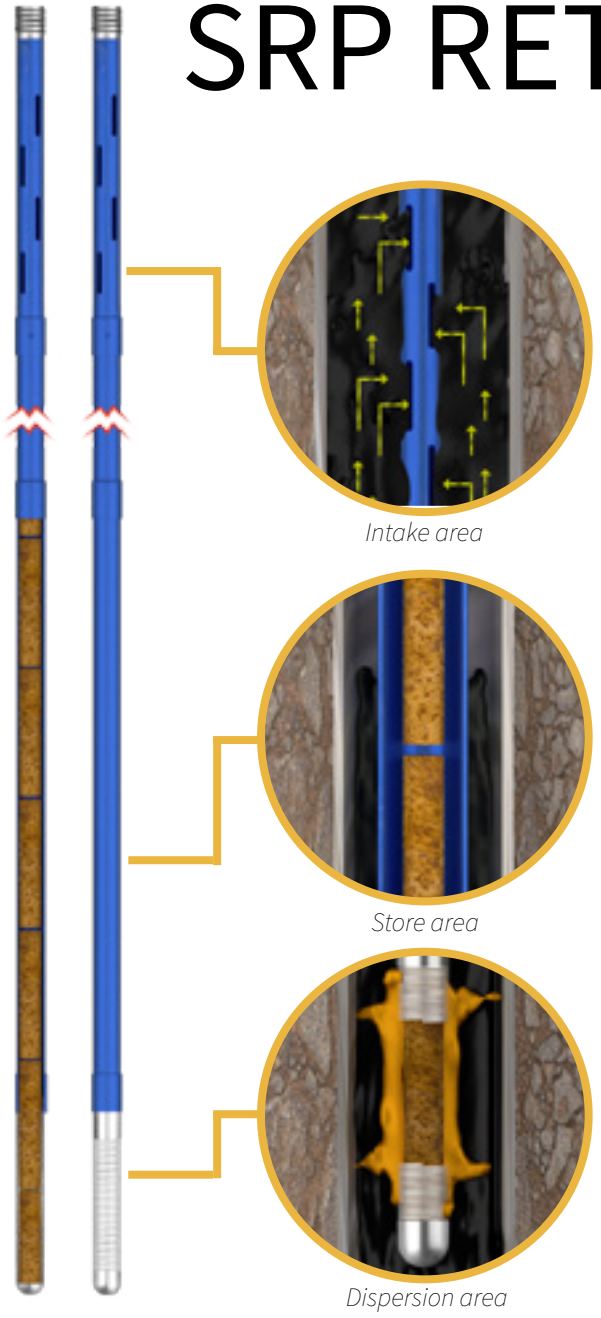

The OSI Retrievable Chem Tool is designed specifically for wells with high lifting cost associated with chemical issues downhole, such as corrosion, scale, paraffin, asphaltenes, etc. The tool provides an even distribution of well-specific chemicals while offering an easy installation.

In Gas Lift or Plunger Lift applications, the tool is installed via slickline, sitting inside the X or XN Nipple, and is held in place with a standard X lock plug. After installation, the tool comes in contact with wellbore fluid, releasing the chemical through the screen at the bottom of the well. It will offer a controlled dispersion, from the bottom up, which protects the artificial lift system. In the case of Sucker Rod Pump with an insert pump, the tool can be installed on the bottom of the pump, replacing the nipple strainer.

*BENEFITS*

- *Slow, self release of chemical(s)*
- *Up to 6 month chemical treatment*
- *Reduces paraffin, scale, and corrosion failures*
- *Variety of well specific recipes (paraffin, asphaltenes, corrosion, scale)*
- *Can be easily installed, set, & retrieved with wireline or slickline*
- *Low installation costs.*

# SRP RETRIEVABLE CHEM TOOL ™



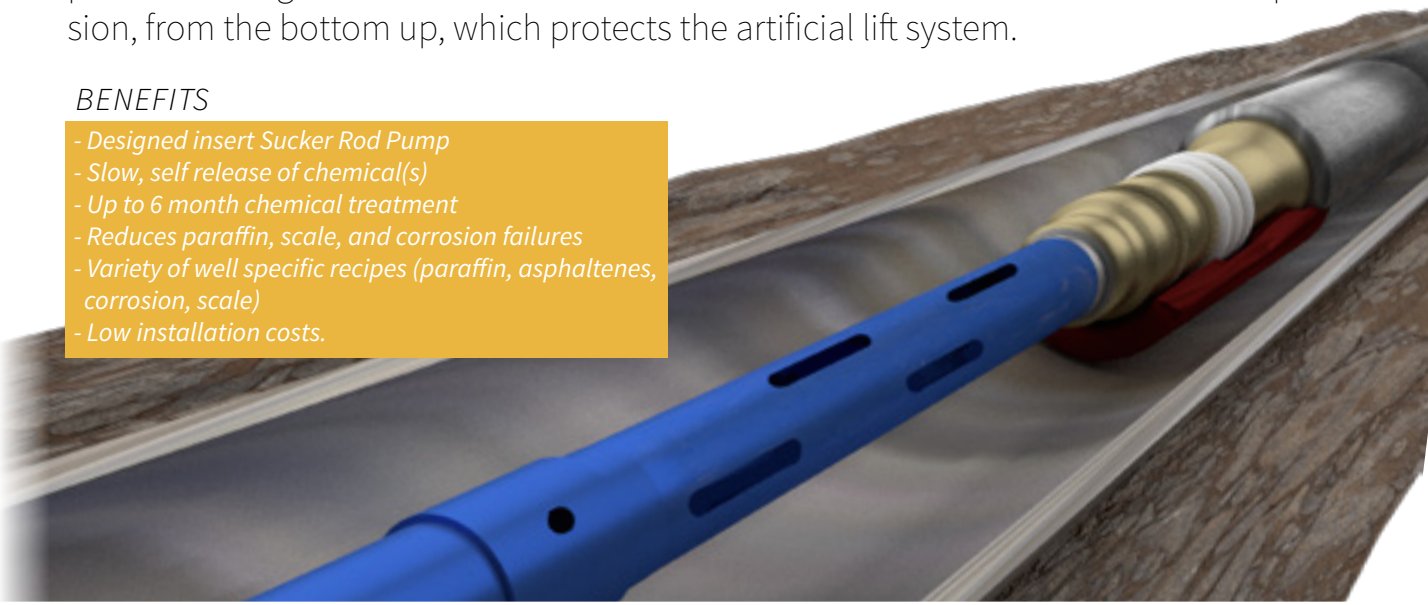

The SRP Retrievable Chem Tool is designed specifically for wells with high lifting cost associated with chemical issues downhole, such as corrosion, scale, paraffin, asphaltenes, etc. The tool provides an even distribution of well-specific chemicals while offering an easy installation.

The SRP Retrievable Chem Tool is easily installed below the coupling of the insert rod pump, which translates into lower operating costs since it is not necessary to pull out the production tubing.

This advantage makes it the best alternative to condition the fluid from the bottom of the well improving the life of the sucker rod pumps and improving the well production. After installation, the tool comes in contact with wellbore fluid, releasing the chemical product through the screen at the bottom of the well. It will offer a controlled dispersion, from the bottom up, which protects the artificial lift system.

*BENEFITS*

- *Designed insert Sucker Rod Pump*
- *Slow, self release of chemical(s)*
- *Up to 6 month chemical treatment*
- *Reduces paraffin, scale, and corrosion failures*
- *Variety of well specific recipes (paraffin, asphaltenes, corrosion, scale)*
- *Low installation costs.*



# TECHNICAL SPECIFICATION

*Filtration / Sand Control*

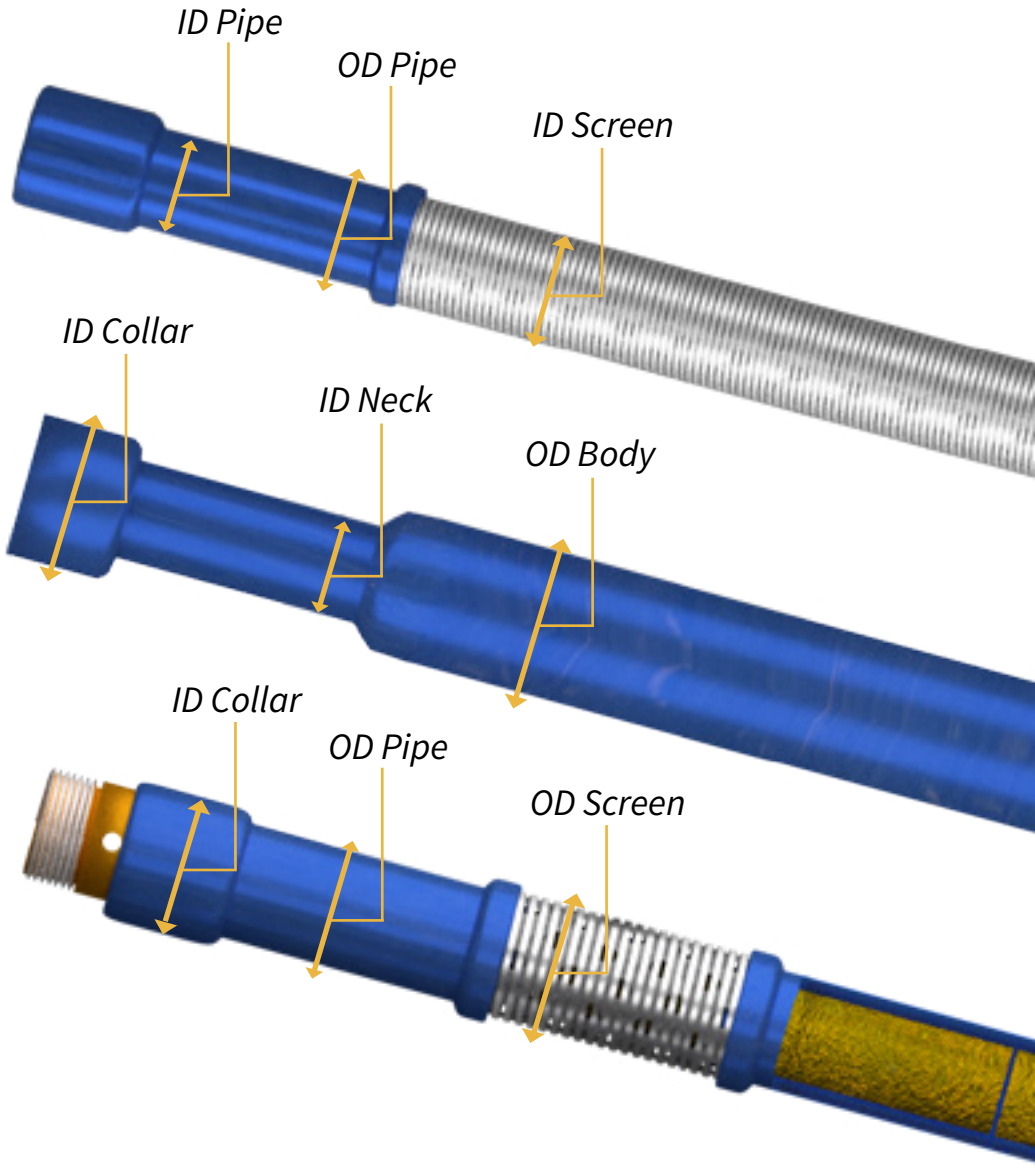
| | Pipe (in) | | Screen (in) | Collar (in) | |
|---|---|---|---|---|---|
| Size s | OD | ID | OD | OD | ID |
| 2 - 3 / 8" | 1.941 | 2.375 | 2.87 | 3.063 | 2.375 |
| 2 - 7 / 8 " | 2.441 | 2.875 | 3.37 | 3.669 | 2.875 |
| 3 - 1 / 2" | 3.066 | 3.5 | 3.94 | 4.5 | 3.5 |

*Gas separation*

| | Neck (in) | | Body (in) | | Collar (in) | |
|---|---|---|---|---|---|---|
| Size s | OD | ID | OD | ID | OD | ID |
| 2 - 3 / 8" x 3" | 2.375 | 1.941 | 3 | 2.5 | 3.063 | 2.375 |
| 2 - 7 / 8 " x 3 - 1 / 2 " | 2.875 | 2.441 | 3.5 | 3 | 3.668 | 2.875 |
| 2 - 7 / 8 " x 4" | 2.875 | 2.441 | 4 | 3.5 | 3.668 | 2.875 |
| 2 - 7 / 8 " x 4 - 1 / 2" | 2.875 | 2.441 | 4.5 | 4 | 3.668 | 2.875 |
| 3 - 1 / 2" x 4 - 1 / 2 " | 3.5 | 3.066 | 4.5 | 4 | 4.5 | 3.5 |
| 3 - 1 / 2" x 5 - 1 / 2" | 3.5 | 3.066 | 5 | 5 | 4.5 | 3.5 |

*Chemical Treatment*

| | Pipe (in) | | Screen (in) | Collar (in) | |
|---|---|---|---|---|---|
| Size s | OD | ID | OD | OD | ID |
| 2 - 3 / 8" | 2.375 | 1.941 | 2.87 | 3.063 | 2.375 |
| 2 - 7 / 8 " | 2.875 | 2.441 | 3.37 | 3.668 | 2.875 |



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