Sand Control Screens

PetroForge Technology

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Introduction – Sand Production & Control

Sand production is a significant challenge in oil and gas production, particularly from **highly transmissible reservoirs**. Let's delve into the details:

1. **Causes of Sand Production**:
   - **Reservoir Strength**: When the stress on the reservoir exceeds its strength, sandstone grains can break loose and be transported by hydrocarbons to the well.
   - **Formation Matrix**: Well fluids moving through the formation matrix can dislodge sand grains, leading to sand production.
   - **Particle Size**: Small particles (less than 40 microns) are generally harmless, but larger load-bearing solids can damage the formation and equipment.
2. **Negative Impacts**:
   - **Erosion and Corrosion**: Sand production erodes and corrodes downhole and surface equipment, causing production interruptions.
   - **Formation Damage**: Extended sand production can reduce overall production and contribute to formation damage.
   - **Equipment Wear**: Casing, tubing, and surface equipment suffer wear due to sand movement.
   - **Flowline and Separator Issues**: Sanded-up flowlines and separators disrupt production.
3. **Mitigation Strategies**:
   - **Sand Control Methods**: To minimize sand production, various methods are available. Notably, **stand-alone screens** and **gravel packs** are commonly used.
   - **Screen Selection**: Choosing the right screen geometry depends on grain size distribution and other reservoir parameters.
   - **Laboratory Tests**: Screen retention tests in laboratories ensure suitability for the reservoir.
   - **Numerical Simulations**: Cost-effective alternatives to lab experiments aid in predicting sand production.

Remember, addressing sand production is crucial for maintaining long-term productivity and equipment integrity in oil and gas wells.

Objectives of sand control systems:

- Control the movement of load-bearing solids
- Create minimal negative impact to the well's productivity
- Remain effective for the well's productive lifespan
- Control the inflow of hydrocarbons from the reservoir into the well and deliver sand-free production, optimizing long-term well performance and boosting recovery factors.

PetroForge having following type of screens:

1. PFT-PS, Premium Screen
2. PFT-PP, Pre-Pack Screen
3. PFT-WWS, Wire-Wrap Screen

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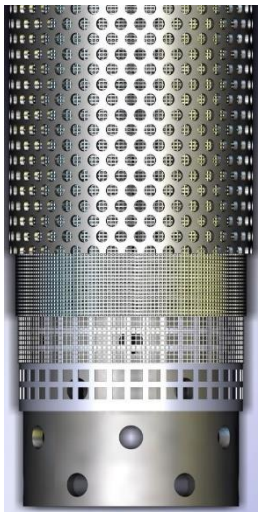
PFT-PS Premium Screens



Premium Screens offer a unique design incorporating multiple diffusion bonded layers of woven metal mesh, creating a single monolithic sand control screen which is robust and has enhanced filtration characteristics.

Premium Screen consists of multiple diffusion bonded layers of sintered metal mesh, creating a single monolithic sand control screen which is robust and has enhanced filtration specific characteristics.

We offers a high strength premium screen design for applications that need high burst and collapse pressure screens. The screen design incorporates a multi-layer construction wherein the filter layer is supported by a drainage layer below and a support layer outside. The number of sintered layers in the screen can vary between two to four layers depending on the application type.

Multiple sintered layers provides the screen with high burst and collapse ratings.

Perforated shroud on the outside protects the screen media and provides a large surface flow area. The diffusion bonded layers with high performance mesh are designed for harsh environments.

Screen's pore structure does not change under high deployment and operating stress loads. The screen pore structure stops heterogeneous sands, resists plugging, promotes high retained permeability, and resists erosion which are key factors for unconsolidated and heterogeneous long horizontal wells.

Features, Advantages, and Benefits

- Available in multiple configurations – combinations of number of filter layers, support layer and inner and outer shroud options.
- Available in various weave type – square, Dutch, and reverse Dutch weave
- Maximum initial and retained permeability compared to other screen options.
- Unique design eliminates all welds within the filter media resulting in a stronger overall structure and the elimination of any potential faulty welds.
- Precise woven metal mesh laminates achieve optimal filtration, uniform flow, and mechanical strength.
- Diffusion bonded (sintered) designs result in a robust monolithic structure that provides fixed pore geometry.
- Fully annealed alloy provides superior corrosion protection.
- Available in standard SS alloys and Alloy 20.

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Application

- Open hole and Cased-hole completions.
- Vertical, deviated, and horizontal completions for oil and gas wells.
- Inflow and Injection control wells.
- Thermal applications.
- Stand-alone and gravel pack completions.
- Pump protection.

Premium Screen

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Specifications

Base pipe Nominal OD (in)	Nominal ID inches (ppf)	Screen OD (in)	Perf size (in)	Perf Density (HPF)	Pipe Open Flow Area (%)
3.5	2.992 (9.2)	4.078	0.375	96	8.00%
4	3.476 (11.0)	4.578	0.5	72	9.40%
4.5	4.000 (11.6)	5.048	0.5	72	8.30%
5	4.408 (15)	5.578	0.5	84	8.80%
5.5	4.892 (17)	6.078	0.5	96	9.10%
6.625	5.921 (24)	7.228	0.5	108	8.50%

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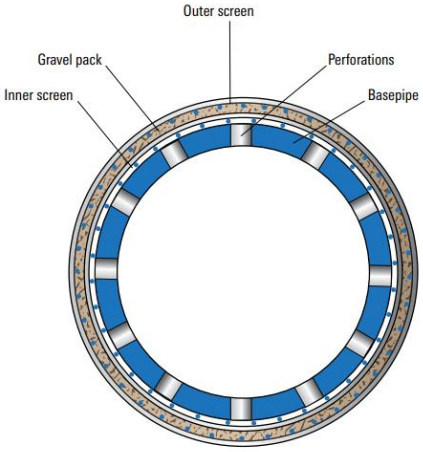
PFT-PP Pre-pack Screens

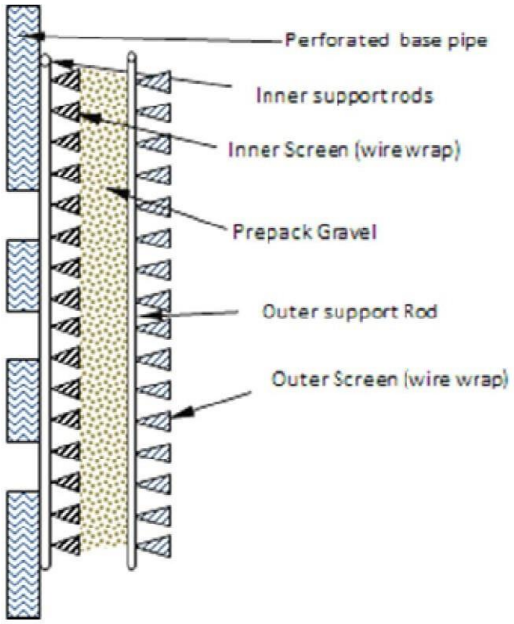
Pre-Pack Screens offer robust and economical solution as an alternative to gravel packing in certain applications. Available in various configurations of Wire Wrapped inner and outer jackets, along with various sand packing options viz. Ceramic Proppant, Resin Coated Gravel, and Natural Sieved Gravel.

Prepack screens offer a robust and economical solution as an alternative to gravel pack in certain applications or used as a screen in gravel pack applications were achieving 100% packing is difficult – risk of premature screen outs. The Prepack screen will act as back-up against voids.



Features, Advantages, and Benefits

- Available in various configurations of Wire Wrapped inner screen jacket and outer screen jacket.
- Consists of Keystone shaped jacket wire and round wire as support rod providing a high flow and strong screen construction
- Available in various sand packing – ceramic proppant, resin coated gravel, natural gravel.
- Available in various base pipe sizes and net screen lengths
- High open flow area and sand retention characteristics
- Rigorous Q&A process ensures no voids in the proppant pack.
- Long Life performance in harsh environment
- Rig time saving.



Application

- Cased hole and open hole gravel packs
- Shallow wells and workover programs where sand control is required, but budget limitations on doing sidetracks.
- Vertical, deviated, and horizontal completions for oil and gas wells

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Specifications

Base pipe Nominal OD (in)	Nominal ID inches (PPF)	Gravel thickness (inches)	Screen OD (in)	Perf size (in)	Perf Density (HPF)	Pipe Open Flow Area (%)
2.375	1.995 (4.6)	0.25	3.577	0.375	48	5.90%
2.875	2.441 (6.4)	0.25	4.077	0.375	60	6.10%
3.5	2.992 (9.2)	0.25	4.702	0.375	72	6.00%
4	3.476 (11)	0.25	5.202	0.5	48	6.20%
4.5	4.000 (11.6)	0.25	5.702	0.5	60	6.90%
5	4.408 (15)	0.25	6.202	0.5	60	6.20%
5.5	4.892 (17)	0.25	6.702	0.5	72	6.80%
6.625	5.921 (24)	0.25	7.835	0.5	84	6.60%
7	6.276 (26)	0.25	8.202	0.5	84	6.20%

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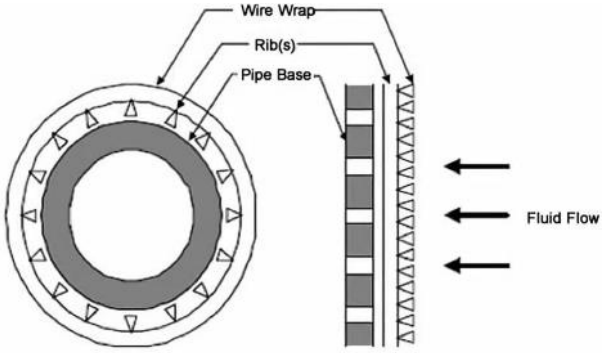
PFT-WWS Wire Wrapped Screens

Wire Wrap Screens are available as Slip-On Jacket with tight tolerances on the slot opening and enhanced Welding procedures. High Open Flow Area options are also available.

Wire Wrap screens provide field-proven and reliable sand control solution. Our Wire Wrap Screens consists of wire wrapped jacket manufactured separately from the base pipe. Pre-fabricated jacket is slipped on to perforated base pipe and welded with end rings to the base pipe providing option for modular make-up on customer supplied base pipe. This screen is ideally suited for Cased Hole Application.

Features, Advantages, and Benefits

- Consistent, accurate slot openings for reliable sand control
- Internal quality control of wrap wire specifications.
- Screens are available in standard service.
- Customized slot openings depending on Particle Size Distribution
- Available in various base pipe sizes and net screen lengths
- Available in various metallurgy of wire including standard 316L and Alloy 20.
- Various design of wire available depending on application such as Keystone and House shaped wires
- Can be handled with standard casing handling equipment thereby reducing rig time.



Applications

- Thermal applications such as SAGD wells.
- Pump protection.
- Suitable for high angle or short radius horizontals such as multi-lateral deployments.
- A more cost-effective alternative to premium diffusion bonded screens when applicable.
- Suitable for stand alone, cased hole, open hole and horizontal completions.
- Inherently damage resistant due to the manufacturing process of directly wrapping to base pipe.

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Specifications

Base pipe Nominal OD (in)	Nominal ID inches (PPF)	Screen OD (in)	Perf size (in)	Perf Density (HPF)	Pipe Open Flow Area (%)
2.375	1.995 (4.6)	2.86	0.375	48	5.90%
2.875	2.441 (6.4)	3.38	0.375	60	6.10%
3.5	2.992 (9.2)	4.06	0.375	72	6.00%
4	3.476 (11)	4.55	0.5	48	6.20%
4.5	4.000 (11.6)	5.08	0.5	60	6.90%
5	4.408 (15)	5.62	0.5	60	6.20%
5.5	4.892 (17)	6.08	0.5	72	6.80%
6.625	5.921 (24)	7.12	0.5	84	6.60%
7	6.276 (26)	7.58	0.5	84	6.20%

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