

PumpGuard

Intake screen and valve assembly

APPLICATIONS

- Reservoirs with poorly defined grain-size distribution
- Reservoirs with widely varying particle sizes
- Recompletions where screens have failed
- Thermal and steam-assisted gravity drainage wells

BENEFITS

- Extends well production time and expedites reserve recovery
- Prolongs rod and ESP pump life and reduces the number of workovers
- Enables planning more efficient and cost-effective workover schedules
- Reduces inventory with no required screen sizing

FEATURES

- Robust design that resists erosion and plugging
- Ability to be configured for vertical and horizontal well requirements
- No need for screen sizing regardless of variation in particle sizes

PumpGuard[†] intake screen and valve assembly is an economical pump intake control system that integrates MeshRite[†] stainless-steel wool screens with a pressure-activated cone valve that can be set to open at a specific differential pressure.

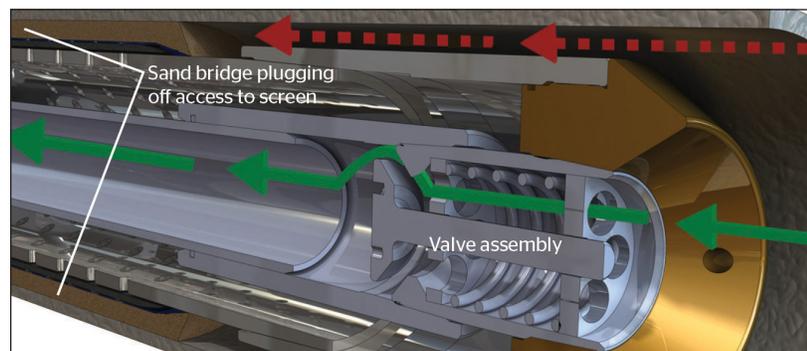
A valve can be installed at the end of the screen, or multiple valves can be configured between screen sections to maximize pump protection and extend pump life.

Installation

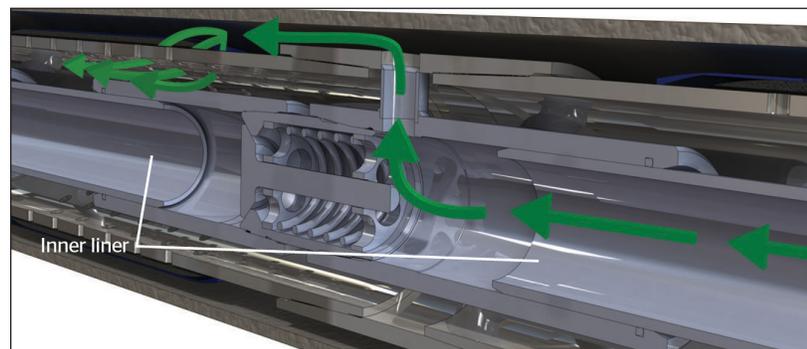
The activation pressure for the PumpGuard assembly's cone valve is set prior to installation. The PumpGuard assembly is usually suspended from a packer slightly below the pump itself to facilitate easier removal, or it can be hung from the pump, if desired. The PumpGuard assembly can run in vertical, deviated, and horizontal wellbores.

Startup

On installation, the valves are closed, causing hydrocarbons to flow radially through the MeshRite screen into the wellbore. The MeshRite screen's compressed stainless-steel wool features triangular-shaped pores with an initial open flow area of 40% and higher retained permeability than other screens. The pores vary in size from 15 to 600 microns, and their irregular shape resists plugging. As sand is stopped at or near the screen surface, open space surrounds these particles and the retained permeability of the screen itself remains high.



Single valve assembly at the end of sand control screen showing sand bridging, with the valve open and allowing flow through the valve into the tubing.



Multivalve assembly installed between screen sections. Sand bridging opens the valve, diverting flow into an inner liner, out a port, and through another screen section with its valve closed, which extends pump life.

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Operation over time

Over time, formation particles fill the annular area between the outer surface of the PumpGuard assembly screen and the production casing wall. As the cavity fills with sand and the particles consolidate, pressure drops across the sand pack, which slows and eventually stops fluid flow. When the pressure drop across the sand pack reaches the preset value, the cone valve opens and allows flow directly through the pump intake. Only at this stage will sand begin to cause wear on the pump, extending the life of the pump by the total operating time during which the cone valve remained closed.

Pump life

The amount of time the pump life is extended depends on the amount of solids produced and these solids flowing directly into the pump. These factors will be influenced by the

- size of the space between the production casing and the outer diameter of the MeshRite screen
- size of the sump below the perforation zone
- particle-size distribution and fluid velocity
- proportion of sand or fluid produced into the wellbore and the rate at which that sand reaches the screen
- amount of fines and particle-size distribution of sand reaching the screen.

Depending on the application, operators may choose to extend the pump life further and delay the need for a workover by installing more than one section of screen with valve assemblies between sections and an inner liner. Sand bridging between the screen and casing causes the valve in that section to open, diverting flow through the cone valve and into an inner liner. The fluid passes out a port between the joints of the screen to another screen section with its valve closed. The pump life is extended until sand bridging opens that valve and flow through subsequent valves reaches the pump.

PumpGuard Specifications

Connection	NU or EU Standard				Standard 8 Round LTC				
Nominal pipe OD, in [mm]	2.375 [60.325]	2.875 [73.025]	3.500 [88.900]	4.000 [10.160]	4.500 [114.300]	5.000 [127.000]	5.500 [139.700]	6.625 [168.275]	7.000 [177.800]
MeshRite screen OD, in [mm]	3.000 [76.200]	3.500 [88.900]	4.050 [102.870]	4.550 [115.57]	5.050 [128.27]	5.550 [140.97]	6.050 [153.67]	7.130 [181.102]	7.650 [194.31]
Valve section intake OD, in [mm]	3.000 [76.200]	3.500 [88.900]	4.050 [102.870]	4.550 [115.57]	5.050 [128.27]	5.550 [140.97]	6.050 [153.67]	7.130 [181.102]	7.650 [194.31]
Valve section length, in [mm]	6.000 [152.400]	6.500 [165.100]	7.000 [177.800]	7.500 [190.50]	8.000 [203.20]	8.500 [215.90]	9.000 [228.600]	9.500 [241.300]	10.000 [254.000]
Valve opening pressure, psi [kPa] [†]	20–50 [137.9–344.7]								
Overall length, ft [m] [§]	60–100 [18.29–30.48] based on 15–20 [4.57–6.09] per joint of MeshRite screen, typically configured using 3–4 joints								

[†]Opening pressure can be set to lower than 20 psi [137.9 kPa] for special requests.

[§]3.5-in [88.9-mm] OD MeshRite screen weighs 10–11 lbm/ft [16.32–19.59 kg/m].

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