

Sand Control Systems

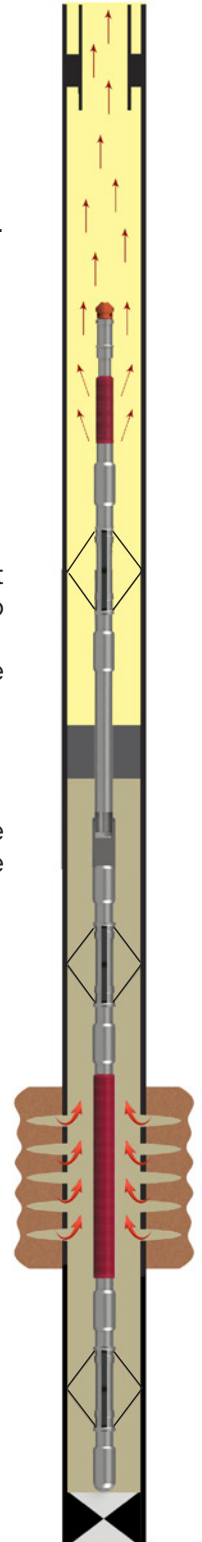
Vent Screen Gravel Pack with Cement Cap

Features/Benefits

- ◆ Used when the top of the vent screen assembly is located in casing below the production tubing.
- ◆ Can be installed using only wireline intervention. Utilizes TTS's proprietary pump and place system. (See Page 8)
- ◆ Can be installed using a volumetric proppant placement system. (See Page 9)
- ◆ Allows high slurry displacement rates for high-rate water packs and frac-and-pack operations.
- ◆ Easily accommodates multiple future plug-backs without using a rig.
- ◆ Can be deployed on wireline, coiled tubing, or jointed pipe.
- ◆ Can be deployed in live wells using TTS's multiple-barrier deployment techniques:
 - Retrievable bridge plug deployment (coiled tubing); (See Page 16)
 - J-anchor deployment/Stackable *Patent Pending (slickline/e-line); (See Page 17)
 - Proprietary Surface deployment (slick/e-line/specialized BOP systems); (See Page 18)
 - Stackable systems for monobore wells (slickline/e-line) (See Page 20)
- ◆ Sand height control valve (SHCV) prevents flow into the vent screen during gravel placement and optimizes column height on blank pipe/casing annulus during high-rate water packs. It also provides positive sand-out indication when it shears.
- ◆ Cement cap prevents proppant column fluidization during production of wells, a common cause of vent screen gravel pack failures.
- ◆ Streamlined vent screen assembly allows clearance for coiled tubing and cement bailers.
- ◆ This system has performed successfully hundreds of times, in all tubing and casing sizes.
- ◆ Available to pass through all popular tubing sizes from 2¹/₁₆" and up.
- ◆ Eliminates excessive pressure draw down due to long sections of blank pipe needed in some applications where distances are excessive between the end of the production tubing and the proposed completion interval.
- ◆ Can be deployed on coil tubing and gravel packed in one trip.

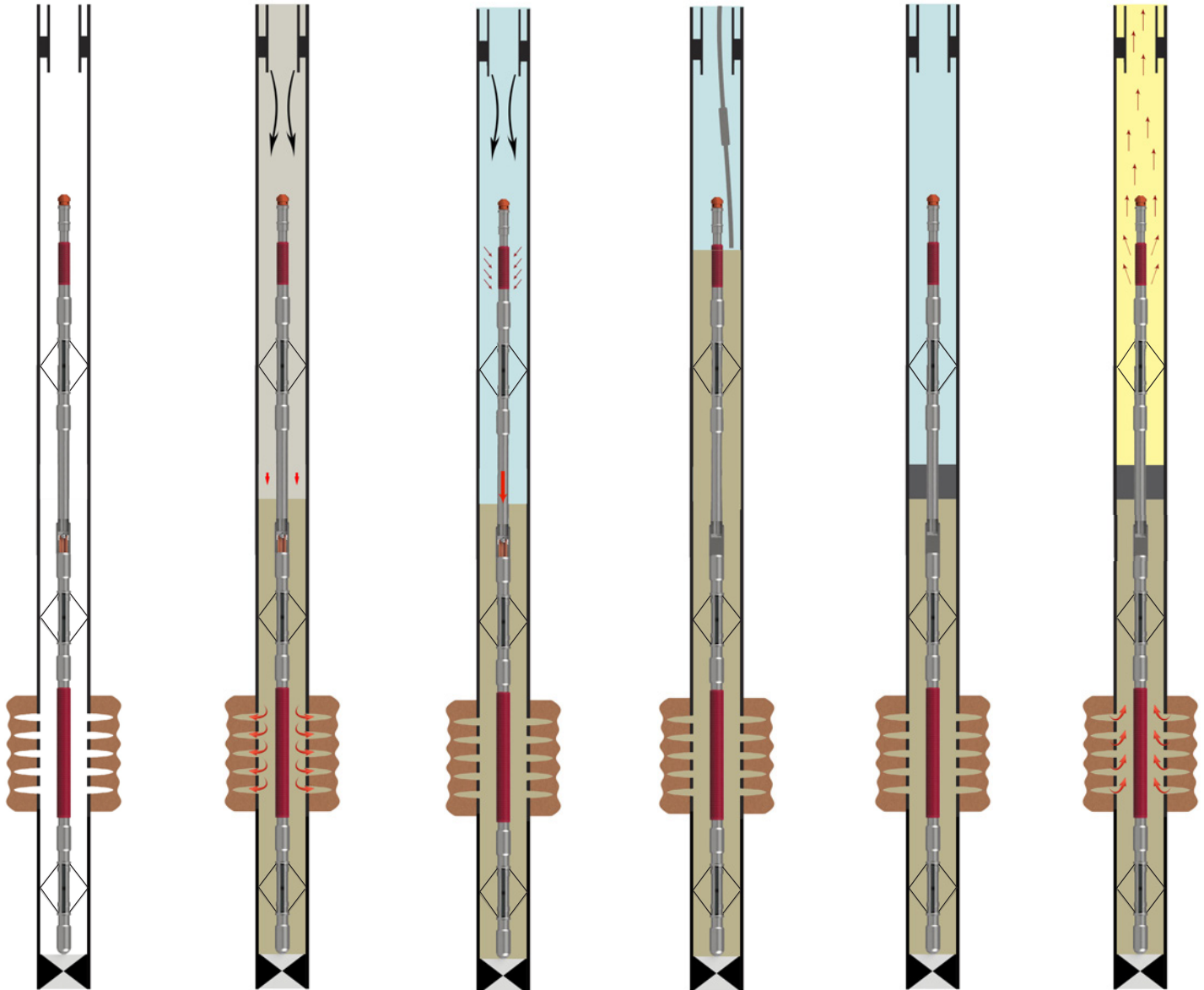
Applications

- ◆ Installed as primary sand control system thru tubing
- ◆ Installed as primary sand control system in monobores
- ◆ Installed as primary sand control system in casing/liners



Sand Control Systems

**Vent Screen with Cement Cap
- Frac Pack, High-Rate Water Pack**



Deploy vent screen assembly at set depth.

Pump gravel slurry via production tubing or coiled tubing.

Gravel covers main screen. Pressure enters vent screen and shears the sand height control valve.

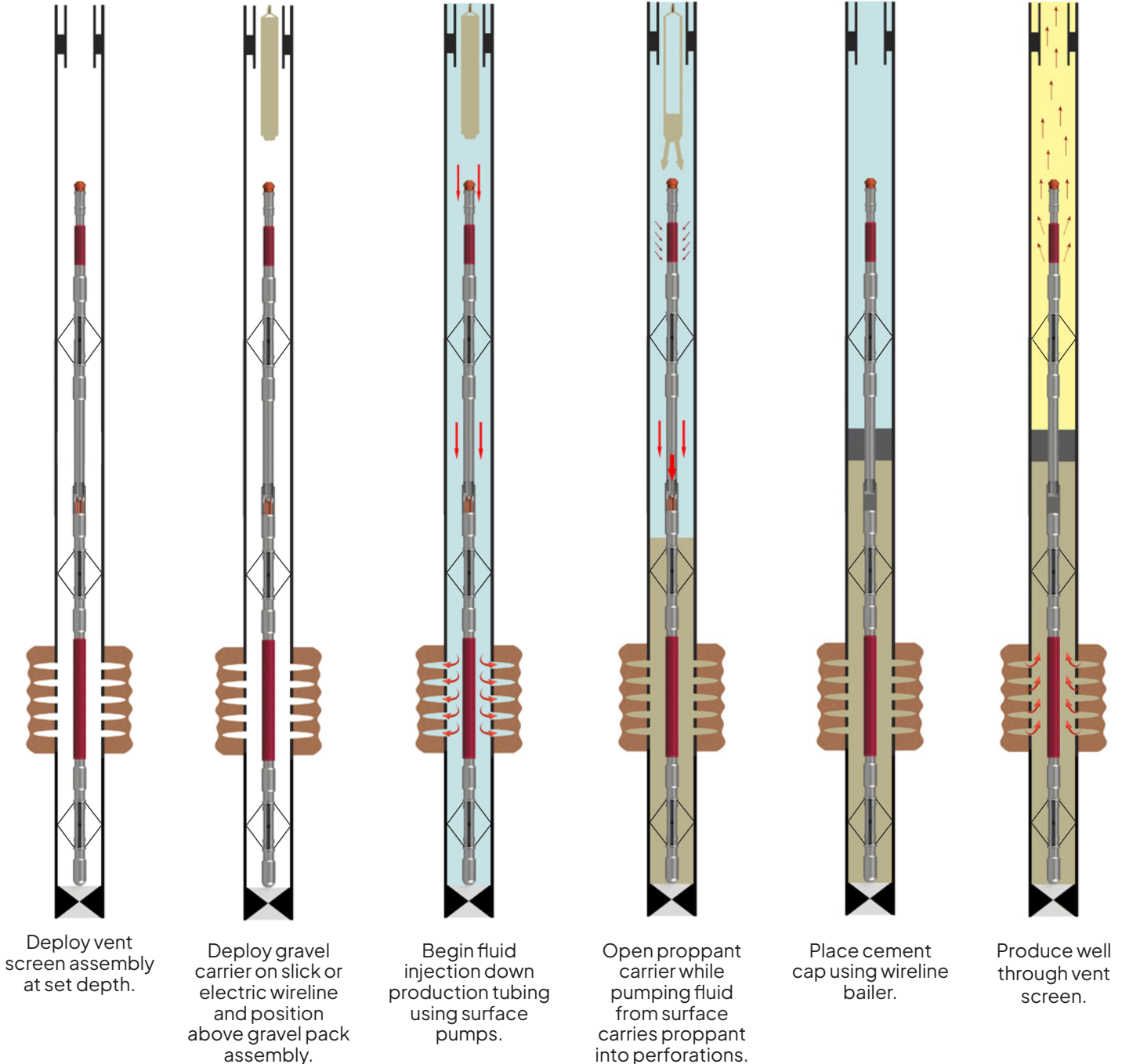
Use coiled tubing to circulate out excess gravel (optional).

Place cement cap using wireline bailer.

Produce well through vent screen.

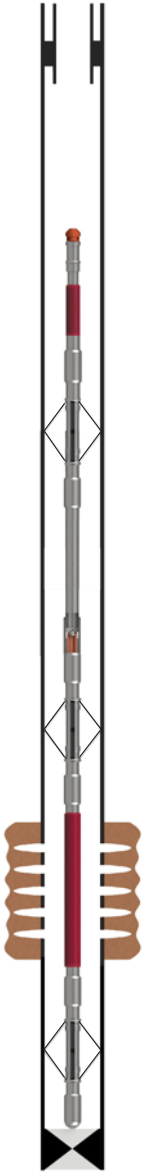
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**Pump and Place Vent Screen with Cement Cap
- Wireline Deployed**

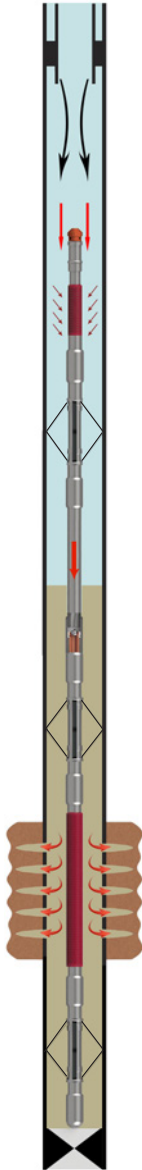


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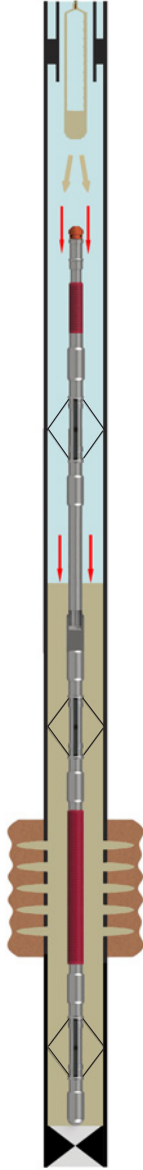
**Volumetric Pumping Vent Screen with Cement Cap
- Wireline Deployed**



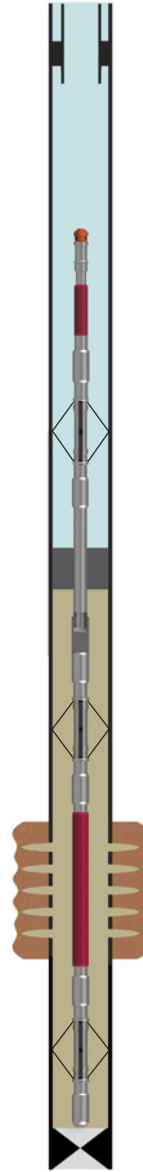
Deploy vent screen assembly at set depth.



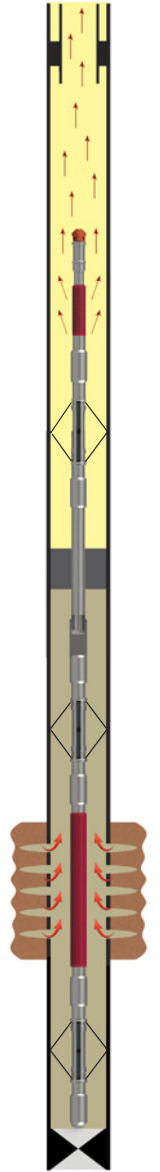
Pump calculated gravel slurry via production tubing.



Top off with proppant carrier using wireline while pumping fluid from surface.



Place cement cap using wireline bailer.



Produce well through vent screen.

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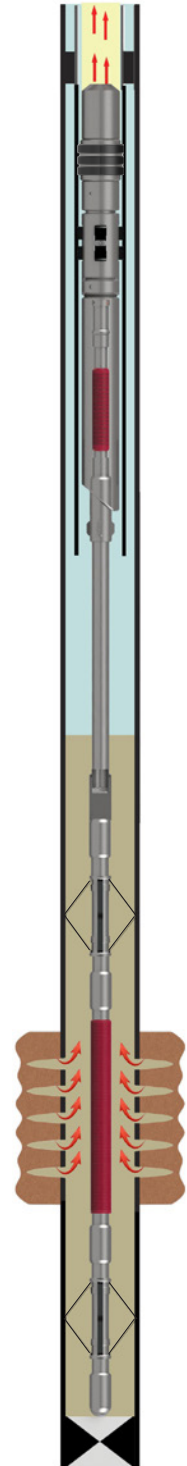
Vent Screen Gravel Pack with Isolation Packer and Overshot

Features/Benefits

- ◆ Used when the top of the vent screen assembly is tied back to the production tubing.
- ◆ Can be installed using only wireline intervention. Utilizes TTS's proprietary pump and place system. (See Page 12)
- ◆ Can be installed using a volumetric proppant placement system. (See Page 9)
- ◆ Allows high slurry displacement rates for high-rate water packs and frac-and-pack operations.
- ◆ Easily accommodates multiple future plug-backs without using a rig.
- ◆ Can be deployed on wireline, coiled tubing, or jointed pipe.
- ◆ Can be deployed in live wells using TTS's multiple-barrier deployment techniques.
 - Retrievable bridge plug deployment (coiled tubing) (See Page 16)
 - J-anchor deployment/Stackable *Patent Pending (slickline/e-line) (See Page 17)
 - Proprietary Surface deployment (slick/e-line/specialized BOP systems) (See Page 18)
 - Stackable systems for monobore wells (slickline/e-line) (See Page 20)
- ◆ Sand height control valve (SHCV) prevents flow into the vent screen during gravel placement and optimizes column height on blank pipe/casing annulus during high-rate water packs. It also provides positive sand out indication when it shears.
- ◆ Isolation Packer prevents proppant column fluidization during production of wells, a common cause of vent screen gravel pack failures.
- ◆ This system has performed successfully hundreds of times, in all tubing and casing sizes.
- ◆ Available to pass through all popular tubing sizes from 2-3/8" and up.
- ◆ Can be deployed on coil tubing and gravel packed in one trip.

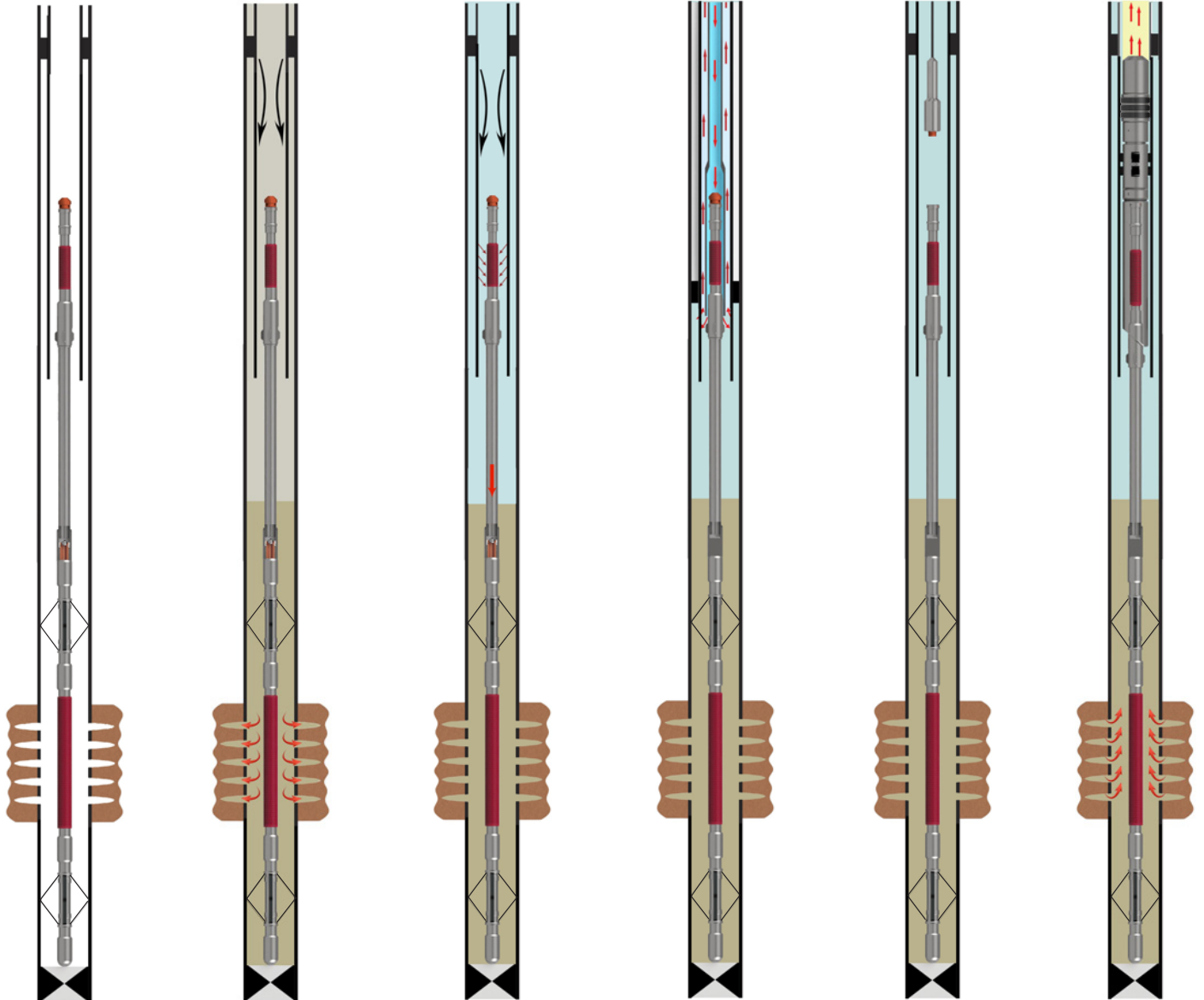
Applications

- ◆ Installed as primary sand control system thru tubing
- ◆ Installed as primary sand control system in monobores
- ◆ Installed as primary sand control system in casing/liners
- ◆ Installed to repair failed rig installed gravel pack systems



Sand Control Systems

**Vent Screen with Isolation Packer and Overshot
- Frac Pack, High-Rate Water Pack**



Deploy vent screen assembly at set depth.

Pump gravel slurry down tubing.

Gravel covers main screen. Pressure enters vent screen and shears the sand height control valve.

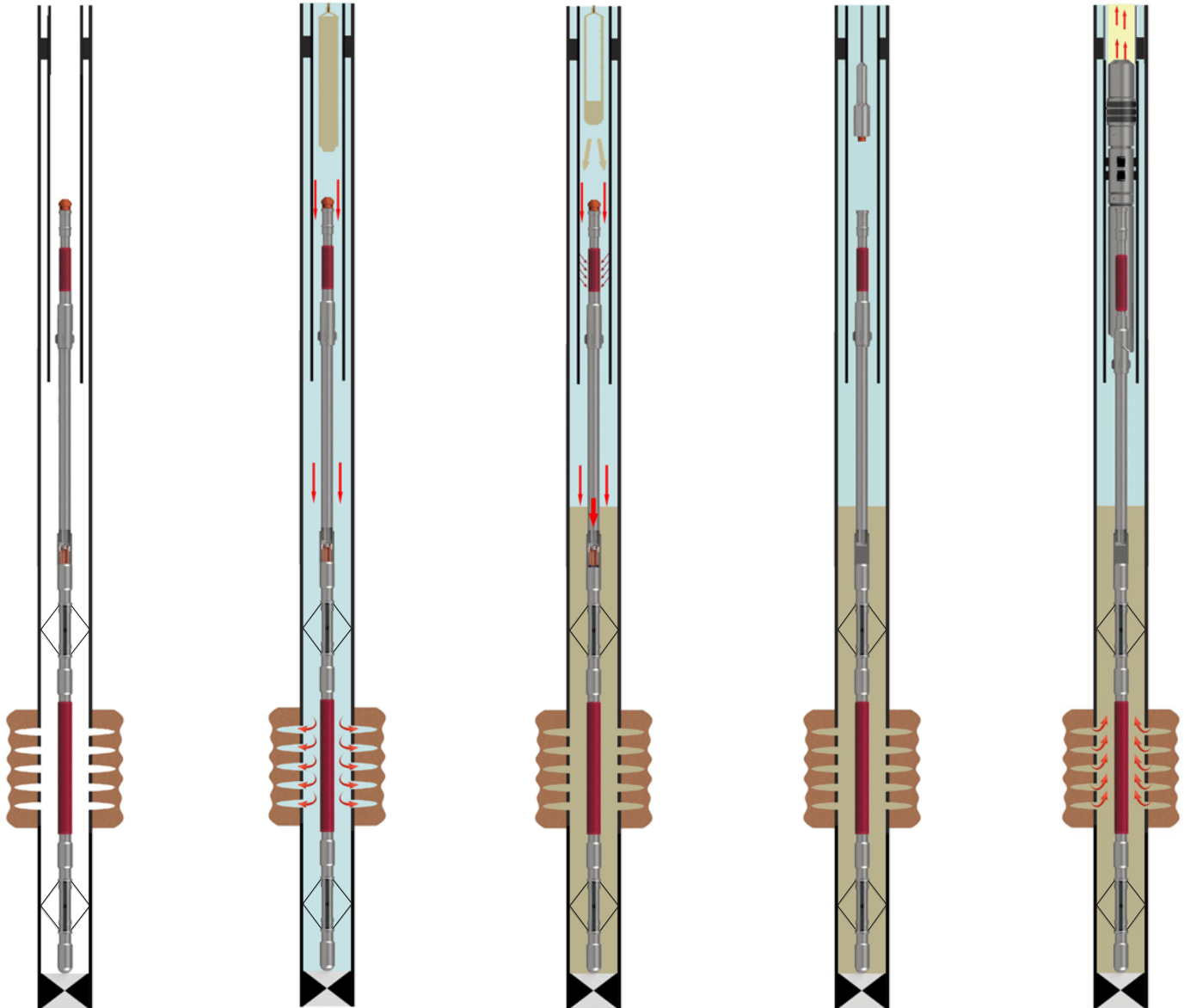
Use coiled tubing to circulate out excess gravel.

Remove vent screen cap using recovery tool on slick line.

Install isolation packer and overshot. Produce well.

Sand Control Systems

Pump and Place Vent Screen with Packer Isolation – Wireline Deployed



Deploy vent screen assembly at set depth.

Begin fluid injection down production tubing using surface pumps.

Open proppant carrier while pumped fluid carries proppant into perforations and screen annulus.

Remove vent screen cap using recovery tool on slick line.

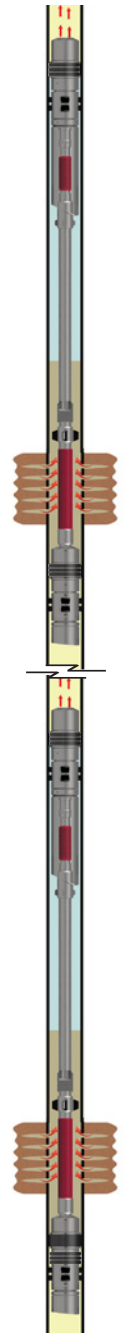
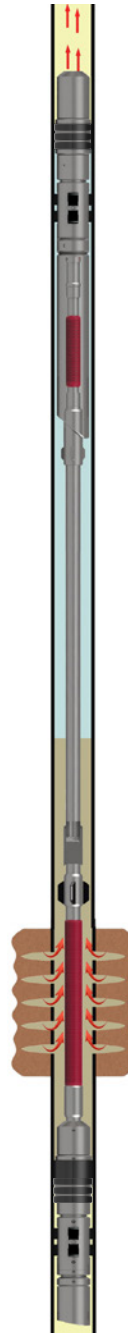
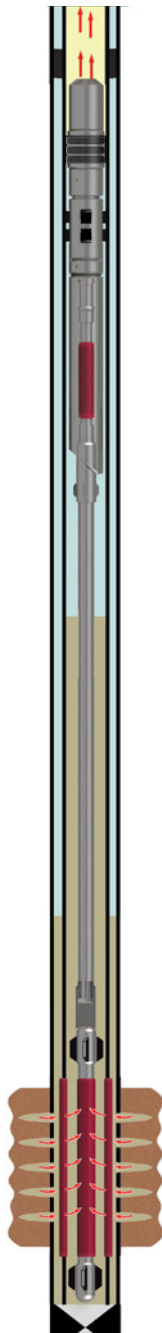
Install isolation packer and overshot. Produce well.

Sand Control Systems

Additional Vent Screen Gravel Pack with Packer Isolation Applications

Repair Failed Cased Hole Gravel Pack

Stackable Monobore Gravel Pack



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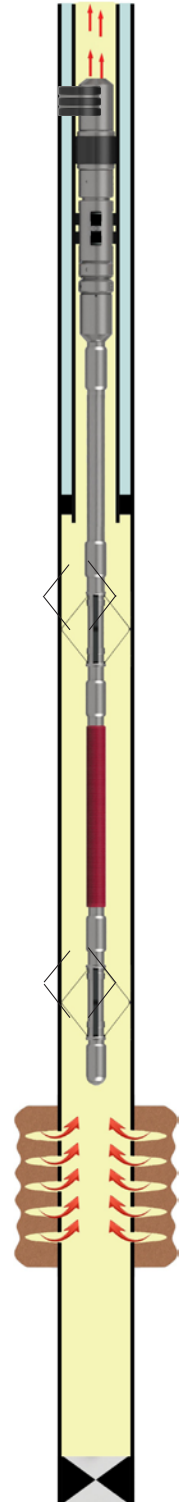
TTS Thru-Tubing Stand Alone Screen Hang-Off

Features/Benefits

- ◆ Available for tubing sizes from 2-3/8" and up. Most popular sizes are routinely stocked for customer convenience.
- ◆ Can be retrieved with coil tubing or slickline in one trip with standard wireline or coil tubing fishing tools. Allows for replacement and repair of failed components.
- ◆ Can be deployed in live wells using TTS's multiple-barrier deployment techniques.
 - Retrievable bridge plug deployment (coiled tubing) (See Page 16)
 - J-anchor deployment/Stackable *Patent Pending (slickline/e-line) (See Page 17)
 - Proprietary Surface deployment (slick/e-line/specialized BOP systems) (See Page 18)
 - Stackable systems for monobore wells (slickline/e-line) (See Page 20)

Applications

- ◆ For use in low to moderate sand producing wells
- ◆ Installed as primary sand control in open hole completions
- ◆ Installed as primary sand control in horizontal completions
- ◆ Used to control post-frac proppant flow back
- ◆ Installed to repair failed rig installed gravel pack systems





Thru-Tubing Systems

United States | Asia | Middle East

[ThruTubingSystems.com](https://www.ThruTubingSystems.com)

Legacy Sand Control Systems

Legacy Sand Control System

Over the years TTS has developed and utilized numerous systems to meet our clients' needs to accomplish rigless sand control. While all of these systems satisfied the needs to provide sand free production, evolving technologies and experience showed us that there were ways to improve on these. The ever-changing economic picture also played a large part in our research and development of this product line. Expansion outside of the Gulf of Mexico and the fact that all types of services are not readily available everywhere also pushed us to develop rigless sand control systems to fit other markets.

The rigless sand control systems exhibited in this section are still available through TTS but are not commonly kept in stock. The systems we provide today have evolved from these and provide the same quality gravel pack, but in an operationally and economically more efficient manner.

Should you feel that one of these systems is the right one for your well please let us know.

Legacy Sand Control Systems

Legacy Series 5012 One Trip Retrievable Squeeze Pack System

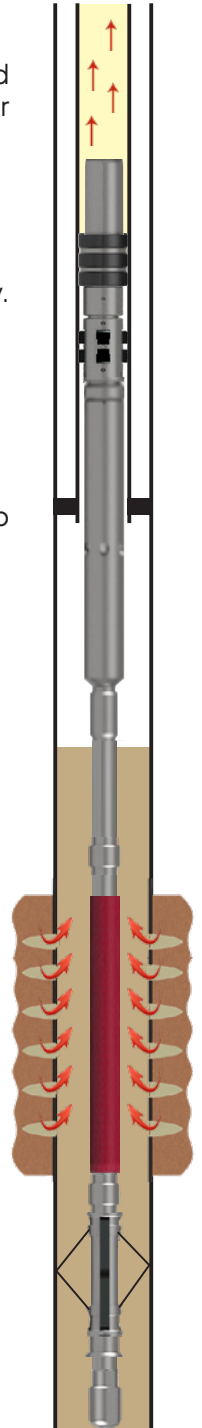
The TTS Series 5012 Retrievable Gravel Pack (GP) Packer System is a specialized packer designed to perform GP Operations in one trip. The system is deployed using coiled or jointed tubing. Packer sealing test and/or pumping of a pre-flush treatment is optional prior to pumping GP slurry.

Features/Benefits

- ◆ One-trip installation of packer and GP slurry.
- ◆ Crossover tool run in squeeze position, only slight pickup required to circulate out excess slurry.
- ◆ Positive seal of GP Port upon completion of GP slurry.
- ◆ Straight Pull Release, no downward manipulation required.
- ◆ Modular Gage Rings allow customized applications.
- ◆ Large ID/OD ratio for larger flow area.
- ◆ Bi-directional caged slips located below the packing system provide increased retrievability.
- ◆ Multi-durometer packing system increases sealing ability.
- ◆ Once Packer is released, the tool is locked in the release position allowing the ability to work up and down once released and not re-engage slips.

Applications

- ◆ Squeeze gravel packs on new and old zones
- ◆ Isolation straddles with pump-in port



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Legacy Series 5000 Thru-Tubing Frac Pack System

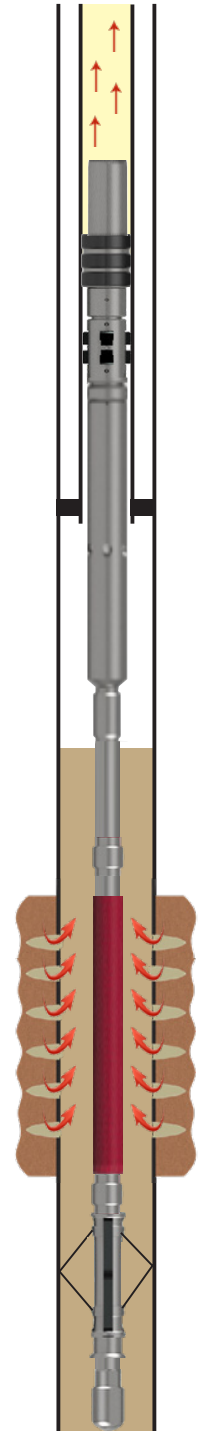
The TTS Series 5000 Thru-Tubing Frac Pack System utilizes a Retrieval Seal Bore Packer, (Model 5000); along with a perforated Frac Pack Extension which includes a closing sleeve and removable Frac Plug combination. The system allows for deployment in one trip via, coil tubing, jointed pipe, electric line or slickline. This system allows for the well to be frac packed thru tubing and still utilize a mechanical sealing and anchoring system. After deployed into the well and the Frac Pack or Gravel Pack applied, the well is then washed out with coil tubing if needed. The Frac Plug is then pulled simultaneously closing the Frac Sleeve. This can usually be done on slickline. The well is then put on production.

Features/Benefits

- ◆ Allows for the ability to frac pack or high rate gravel pack the well with a coil tubing or wireline deployed thru-tubing system. Cost saving over other systems requiring a work over rig.
- ◆ Employs use of mechanical sealing and anchoring device as opposed to most vent screen frac pack systems. Eliminates the complexity and uncertainty of proper gravel pack proppant isolation and subsequent proppant flow back associated with typical vent screen frac pack systems.
- ◆ System simplicity; contains no reciprocation crossover tools and work-string attachments. Eliminates the chance of sticking crossover tools and other work sting related risk.
- ◆ Frac pack or gravel pack slurry is pumped through the production string as opposed to coil tubing or small work-string which limit pump rate when deployed thru tubing. Allows for high rate pumping of frac pack or high rate gravel pack.

Applications

- ◆ Installed as primary sand control system thru tubing
- ◆ Installed as primary sand control system in monoboresh
- ◆ Installed as primary sand control system in casing
- ◆ Installed to repair existing failed sand control systems thru tubing



Legacy Sand Control Systems

Legacy Series 5100 Inflatable Circulating or Squeeze Gravel Pack System

The TTS Series 5100 Circulating Thru-Tubing Gravel Pack System utilizes a retrievable Inflatable Packer, Two-Position Crossover Tool, Lower Gravel Pack Perforated Extension with closing sleeve and wash pipe in order to accomplish a one trip coiled tubing deployed circulating Thru-Tubing Gravel Pack.

This system allows for deployment of the GP BHA on coiled tubing, as well as Setting and testing of packer prior to pumping of the gravel pack slurry.

The Two-Position Crossover Tool allows for circulating below the Packer (lower circulating or gravel packing position) and an upper circulating or reverse position for spotting fluids, reversing or circulating above the packer.

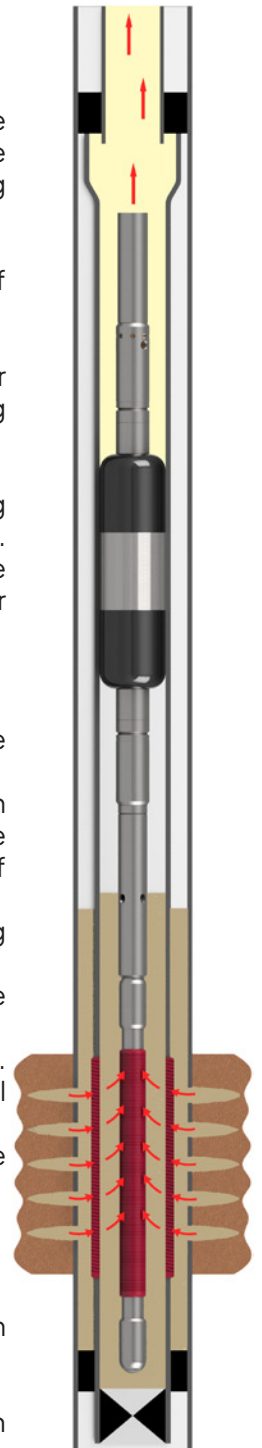
The upper position establishes isolation from the producing interval for guaranteed circulating above the Gravel Pack Packer for removing excess slurry from the work string, regardless of BHP. Upon completion of the gravel pack pumping operation, a closing sleeve is installed to isolate the ports in the Gravel Pack Perforated Extension. This is accomplished by removal of the Crossover Tool and Wash Pipe Assembly when POOH.

Features/Benefits

- ◆ Allows for repair of cased hole gravel pack without the expense of a workover rig. “Saves time and cost compared to conventional workovers”.
- ◆ Inflatable packer system allows for setting of TTGP packer below the end of the production tubing. Negates problems associated with production tubing movement. Does not interfere with future plug backs when production tubing removal is required. Enables shortening of TTGP assembly.
- ◆ One trip installation. Does not require additional trips in well to install anchoring or sealing accessories.
- ◆ Allows for a circulation or squeeze type Gravel Pack. Better accommodates inflow performance over typical pre-packed screen hang-off.
- ◆ Isolation sleeve positively closes and seals off GP Perforated Extension below packer. Eliminates time and cost associated with additional trips into the well needed to install additional sealing accessories.
- ◆ Ability to test all sealing and anchoring components prior to gravel packing. Allows for positive pressure test and assurance of proper packer placement.

Applications

- ◆ Repair of failed Cased Hole Gravel Pack
- ◆ Installation of Circulating or Squeeze Gravel Pack in wellbores where no sand control system currently exists
- ◆ Installation of Thru-Tubing Gravel Pack where wellbore restriction may exist
- ◆ Thru-Tubing Gravel Pack installation where installation is to be set in a larger I.D. tubing than deployed through



*Patent # 5,975,205