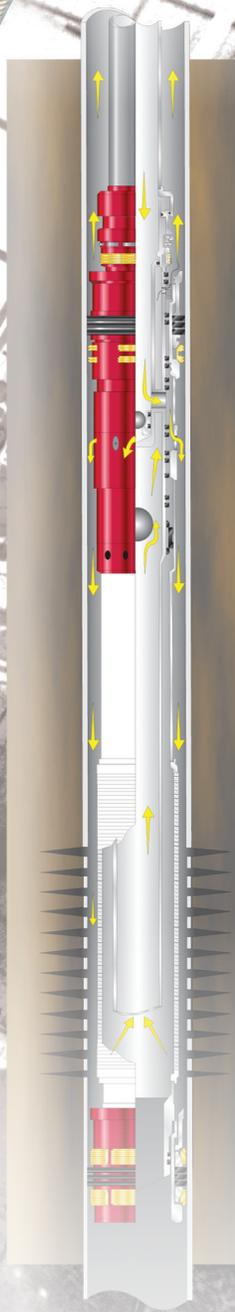
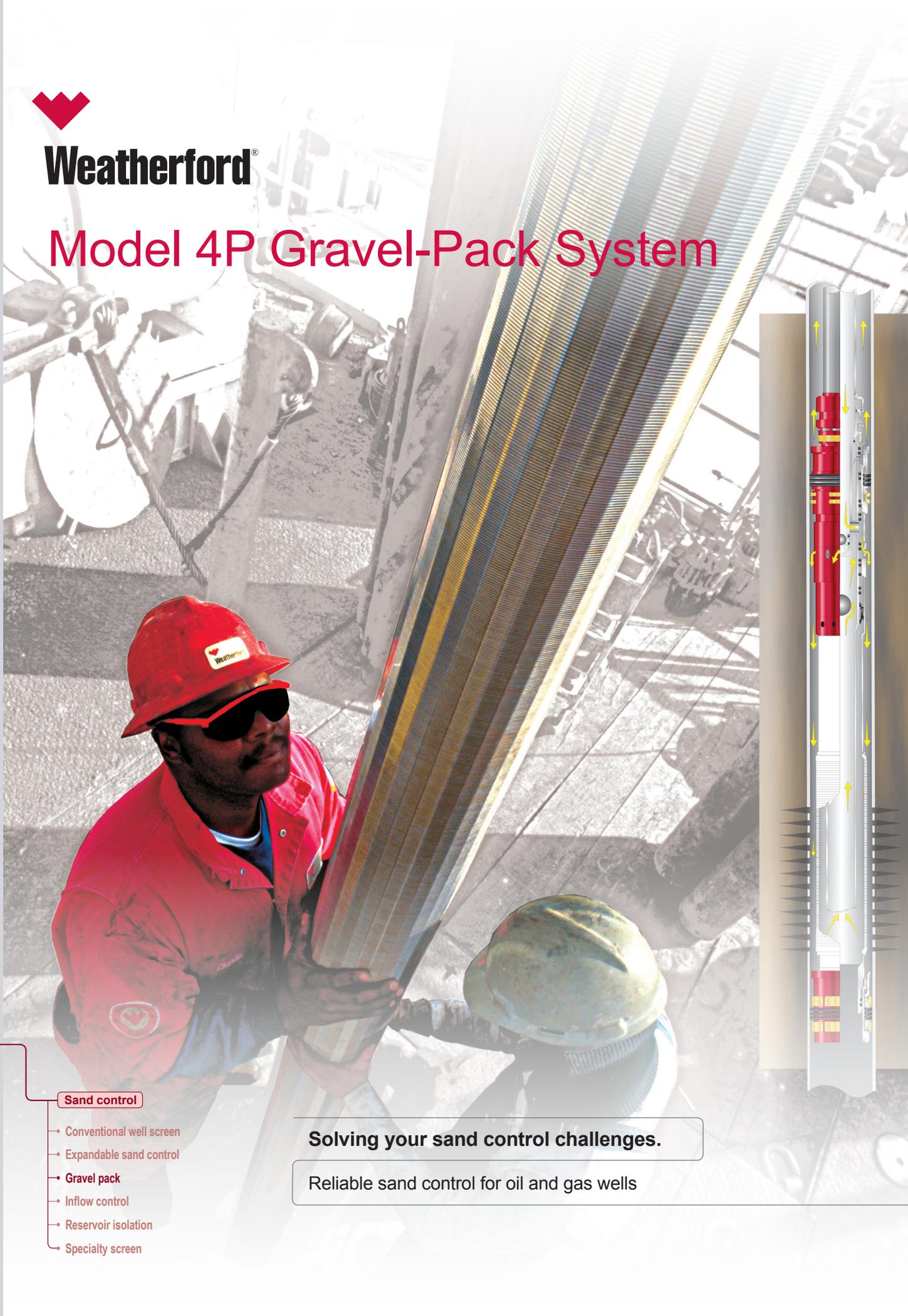




Weatherford®

Model 4P Gravel-Pack System



Drilling



Evaluation



Completion



Production



Intervention

Sand control

- Conventional well screen
- Expandable sand control
- **Gravel pack**
- Inflow control
- Reservoir isolation
- Specialty screen

Solving your sand control challenges.

Reliable sand control for oil and gas wells

An effective, field-proven treatment

Sand production occurs when production-related forces exceed the restraining forces of individual sand grains in formation rock, often leading to costly repairs and lost production. For decades, operators have successfully dealt with this problem through gravel-packing, using tools like Weatherford's model 4P gravel-pack system. This well-established completion procedure essentially creates a reliable and durable downhole filter that keeps the load-bearing grains of sandstone reservoirs stationary, preventing them from breaking away and being introduced into the wellbore with produced fluids.

Proven components for virtually any production, completion or injection operation

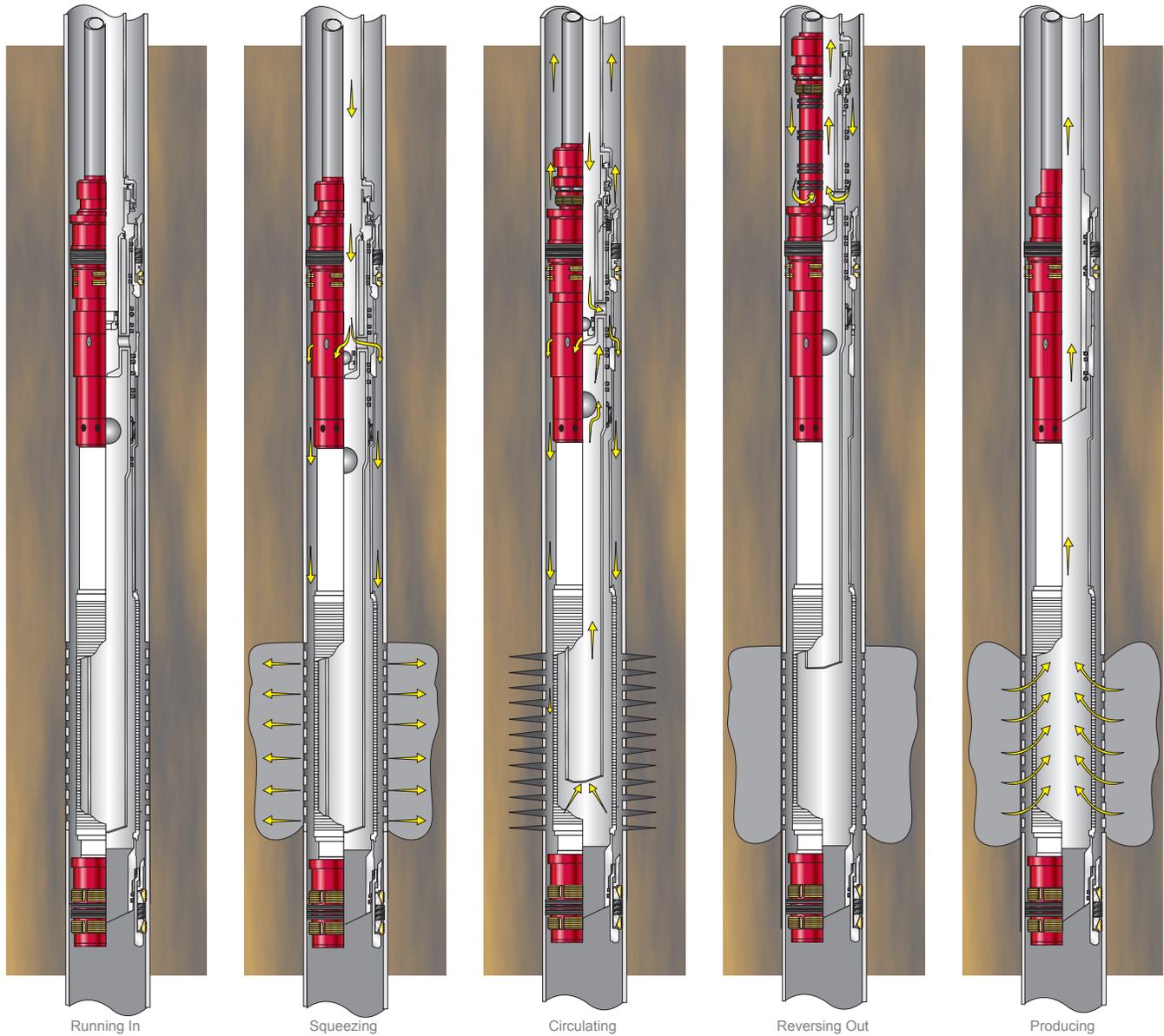
At the heart of the model 4P gravel-pack system is Weatherford's durable and reliable BlackCat™ retrievable sealbore packer. Used with the model G1 closing sleeve, the *BlackCat* packer enables the reliable deployment of well screens, properly mounting them into the well casing and routing sand into the screen annulus. After the gravel pack is performed, this durable packer can remain in the well as the production packer, providing long-term, reliable performance. Other 4P gravel-pack system components include

- Weatherford's heavy-duty, dual-piston hydraulic setting tool to reliably carry in high-weight gravel-pack installations;
- an easy-to-operate model 4P crossover service tool to enable dependable and economical gravel-pack operations at low-to-medium rates and pressures.





Simplicity of operation

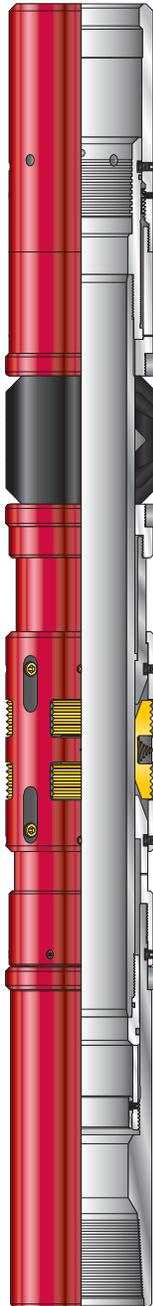


1. Deploy the gravel-pack assembly into the well until the assembly is on bottom with the screens placed across the producing or injection interval.
2. Drop the setting ball and apply pressure to the work string to set the packer.
3. Apply pressure to the casing to test the packer and then release the setting tool.

4. Leave the crossover tool fully down in the well until the crossover tool is in the *squeeze* position so that any fluid pumped down the work string is injected into the formation.
5. Raise the crossover tool from 1 to 3 ft (0.30 to 0.91 m) to expose the return ports and achieve a *circulating* position so that fluid pumped travels in the screen by wellbore annulus, enters the washpipe and flows up the casing above the packer.

6. Raise the crossover tool until the ports are above the packer to place the tool in the *reverse* position for circulating above the packer or reverse-circulating excess and slurry out of the well.
7. Once the treatment is complete, pull the crossover tools from the packer assembly and run the production tubing.

4P gravel-pack system components



The BlackCat™ GP packer

The GP version of Weatherford's *BlackCat* retrievable sealbore packer is well suited for a wide range of well conditions, including high-deviation, high-pressure and high-temperature applications. The packer is equipped with the standard ECNER array element package, a patented sealing device that enables the packer to pack off easily and resist swabbing under the most demanding conditions.

Once set, the *BlackCat* packer remains set and anchored regardless of the type and direction of forces applied. To remove the packer, production tubing is removed from the well, and a retrieving tool is run into the well and stabbed into the packer. Once this integral releasing mechanism is actuated, the packer can be freely removed from the well. If normal retrieval procedures cannot be followed, the packer's components are rotationally locked to facilitate milling operations. The *BlackCat* packer is available in an extended range of casings in both API and non-API sizes, including the following models: 5-1/2, 5-3/4, 6, 6-5/8, 7, 7-5/8 and 9-5/8 in.

Model G1 closing sleeve

The Weatherford G1 closing sleeve provides a passageway for the sand slurry to exit the work string and crossover tool and enter the annulus area around well screens. A sealbore below the closing sleeve serves to seal the crossover tool so that all sand slurry is isolated from the inside of well screens. The closing sleeve automatically opens and closes as crossover tools are inserted through or withdrawn from the gravel-pack assembly. Once the gravel pack is completed and the crossover tool is withdrawn, the sleeve is closed to prevent unwanted flow around the screen and blank, which could cause the unintended removal of gravel-pack sand. It also serves to isolate the formation when isolation valves are run for fluid-loss or well-control purposes.



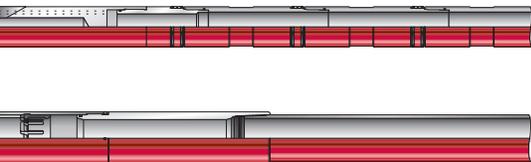


Dual-piston, hydraulic setting tool

The dual-piston, hydraulic setting tool is designed for carrying in high-weight assemblies, such as gravel-pack installations. This rugged and reliable setting tool is designed for demanding applications and can be equipped with various adapter kits to match the specific packer being used. Ball seats for applying pressure to the setting tool are located in the crossover tools. Once the packer is set and tested, the setting tool is released from the packer, either by applying pressure to the casing or by applying eight to ten right-hand turns at the packer to unthread the latch from the packer.

Model 4P crossover tool

The 4P crossover tool is specifically designed for the reliable and economical application of gravel-pack operations delivered at low-to-medium rates and pressures. The crossover tool is simple to operate and easily maintained, providing an economical alternative to tools used in high-rate treatments. The crossover tool can be easily manipulated by lowering or raising the work string while being used to *circulate, squeeze or reverse* positions. Tool positions are easily tracked by the distance the pipe on the surface is raised, simplifying operations for the tool specialist and rig crew while minimizing time spent changing tool positions and performing the gravel pack.



Well screens for every sand-control completion

With global ISO 9001 manufacturing facilities strategically located around the world, Weatherford can offer the greater economies of scale that bring real bottom-line value to our clients. While meeting or exceeding ISO 9001 standards, Weatherford is one of the few manufacturers that build every element of a well screen—from raw materials to finished products—entirely in our own plants.



The well screen has been a key component of sand-control completion systems, either as an integral part of the gravel pack or as a stand-alone provider of sand control.

The wedge-profile wire, welded construction and self-cleaning designs are standard elements of our well screens. Whether they are used to retain gravel-pack sand and keep formation grains in place or to filter formation solids from well effluents, count on Weatherford's well screens to provide necessary and effective sand control.

Weatherford provides a full range of well-screen options, including premier wire-wrapped, prepacked and metal-mesh conventional screens. Our sand-control portfolio also includes full and zonal isolation, as well as inflow control devices.



Max-Pak® and Micro-Pak® prepacked sand screens



Ultra-Grip™, Dura-Grip® and Super-Weld® wire-wrapped sand screens



Excelflo® and Maxflo® metal-mesh sand screens



Model 4P gravel-pack tool matrix

Casing (in./mm)	Weight (lb/ft, kg/m)	Packer Bore (in./mm)	Packer OD (in./mm)	Part Number			
				Packer	Closing Sleeve ^a	Setting Tool ^b	Crossover Tool ^c
5-1/2 139.7	20.0 to 23.0 29.76 to 34.22	3.00 76.20	4.500 114.300	1119607	783723	1120251	1120252
	14.0 to 20.0 20.82 to 29.76		4.625 117.475	1119153			
5-3/4 146.1	17.0 to 19.5 25.30 to 29.00		4.791 121.691	1124741			
6 152.4	20.0 to 26.0 29.76 to 38.69		4.791 121.691	1124741			
6-5/8 168.3	20.0 to 28.0 29.76 to 41.66		5.540 140.716	1125798			
7 177.8	29.0 to 35.0 43.15 to 52.08	4.00 101.60	5.813 147.650	905230	173441	712224	785934
	23.0 to 32.0 34.22 to 47.62		5.938 150.825	905231			
	20.0 to 26.0 29.76 to 38.69		6.026 153.060	1203228			
7-5/8 193.7	29.7 to 39.0 44.19 to 58.03		6.438 163.525	905688			
9-5/8 244.5	47.0 to 53.5 69.93 to 79.60	4.75 120.65	8.281 210.337	1137306	1137355	712224	1138284 ^d
		6.00 × 4.75 152.40 × 120.65		1184277			1181879 ^d

^aExtensions required
^bAdapter kit required
^cShifting tool required
^dLong-stroke washdown versions

Proven accessories for post-treatment control of fluid loss and influx

Weatherford provides various products for isolating perforated or openhole intervals after the gravel pack has been executed and the service tool is withdrawn. These accessories help prevent fluid loss and unwanted flow of oil or gas while protecting upper-zone operations.

Retrievable isolation plug (RIP)

This heavy-duty, retrievable plug is set in the BlackCat™ packer at the lower gravel pack when completing multiple-zone wells. The RIP isolates the lower zone as the next zone is perforated and prepacked. The plug can be set in the same run with tubing-conveyed perforating guns and retrieved on the subsequent cleanout trip.

OptiSlim™ sliding sleeve isolation strings

Weatherford's *OptiSlim* sliding sleeve provides a bidirectional barrier ideal for isolating a zone from fluid loss or well flow or for incorporating an integral isolation string into the screen assembly.



Meet any sand-control challenge

Weatherford offers a full line of reliable, cost-effective equipment for the lower-completion, sand-control systems in open or cased holes and a full range of upper-completion products.

- Gravel-pack systems
- Conventional sand screens
- Expandable sand screens
- Openhole isolation packers
- Inflow control devices
- Production packers
- Service tools
- Subsurface safety valves
- Flow control
- Downhole control valves
- Intelligent wells

Discover how our class-leading equipment enhances production by delivering proven, cost-effective sand control for virtually any oil or gas well completion. Contact your authorized Weatherford representative, or visit weatherford.com.



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