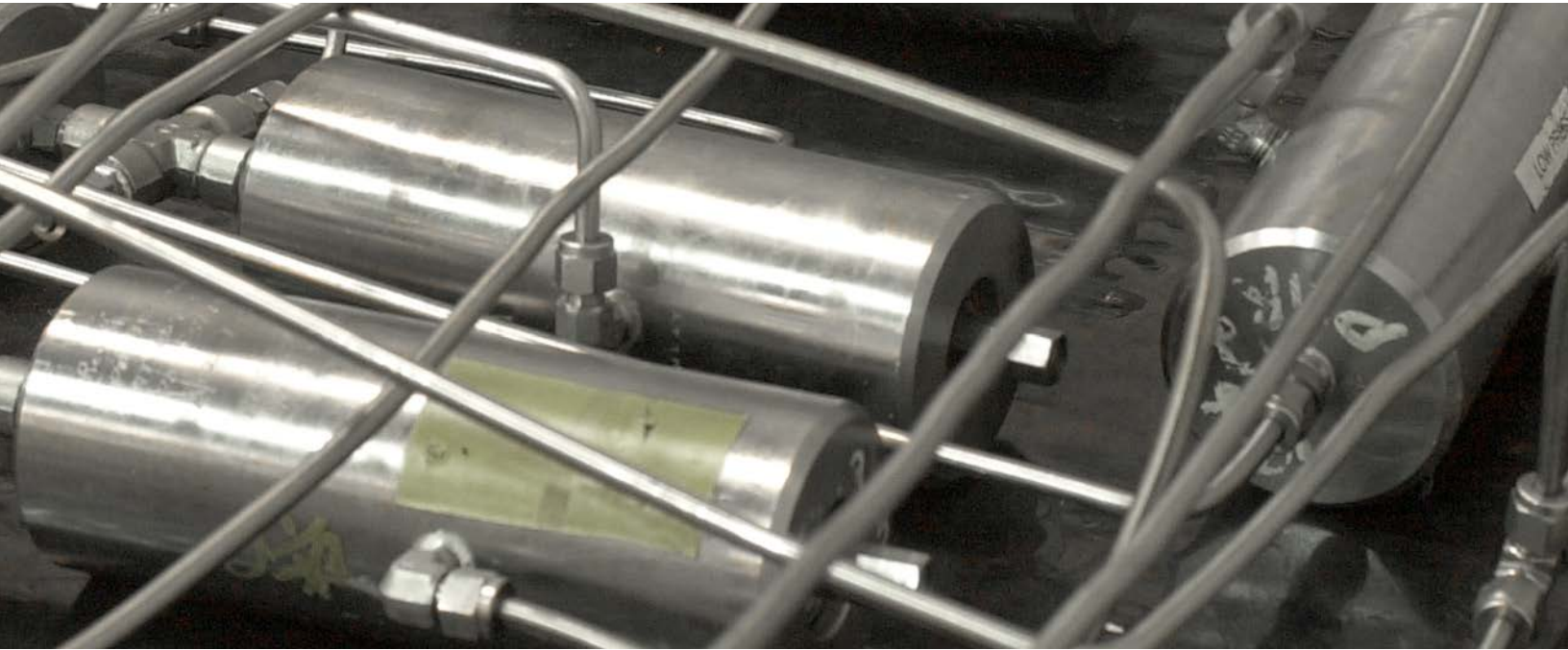




COMPLETION SERVICES

## SECTION 2

# Single-Trip Systems



## SINGLE-TRIP SYSTEMS

ComPlete™ MST System	6
ComPlete™ RST System	8
ComPlete™ PST System	10
ComPlete™ HST System	12

## ACCESSORIES

### ComPlete™ MST System

Decripler Sub	14
Disappearing Check Valve	15
Multi-Profile Multi-Service Valve	16
Multi-Profile Shifting Tools	18

### ComPlete™ RST System

Depth Verification Tool	19
Multi-Cycle On-Off Tool	20

### ComPlete™ HST System

Pressure-Actuated Differential Valve	21
Ball-Actuated Anti-Reversing Valve	22

## ComPlete™ MST System

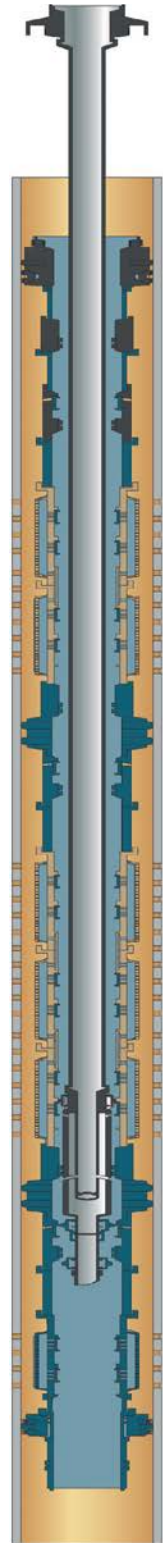
Superior Completion Services' **ComPlete™ Multizone Single-Trip (MST) System** uses a patented method to reduce the number of trips necessary to conventionally stimulate and complete multiple intervals in a wellbore. Rig time associated with conventional multizone stacked completions is reduced, offering an attractive economic alternative to the stack and frac-pack completion technique. Although a typical application for the **ComPlete™ MST System** would be two to six intervals, there is no limit to the number of zones that can be effectively completed.

### APPLICATIONS

- Ultra-deep completions
- Multizone completions
- Zonal isolation and selective production
- Sand and non-sand control applications

### Features and Benefits

- Full-bore ID is compatible with production tubing
- Provides positive independent zonal isolation for each interval during completion and production operations
- No limit on zone lengths; a minimum of 30 ft (10 m) distance is required between intervals
- Retrievable, testable, dual-element isolation packer provides reservoir isolation during stimulation and production
- Proprietary technology includes new sealing elements at each interval for added reliability
- Proprietary locating design offers new indicator and set-down point with defined slurry port alignment when stimulating each interval
- Every position is mechanically identified and hydraulically verified, providing enhanced diagnostics
- Service tool configuration offers circulating position with real-time live annulus monitoring, as well as conventional squeeze treatment capability
- Selective production may be initiated with slickline-, wireline-, tractor- or coiled tubing-conveyed shifting tools
- May be integrated with interventionless production initiation systems
- Available with a patented screen communication system that enhances treating capabilities and provides a continuous production flow path
- Compatible with other ComPlete™ Single-trip Systems and Superior Completion Services' Intelligent System



## ComPlete™ MST System

### TECHNICAL DATA

Temperature Rating 350°F (177 °C)

ComPlete™ MST System									
Casing Size		System Bore		Differential Pressure Rating		Pump Rate	Total Proppant		Proppant Type
inch	mm	inch	mm	psi	MPa	BPM	lb	kg	
7	177.8	2.75	69.9	10,000	68.9	25	600,000	272,727	20/40 Bauxite
7 $\frac{3}{4}$	193.7	2.75	69.9	10,000	68.9	25	600,000	272,727	20/40 Bauxite
7 $\frac{3}{4}$ - 7 $\frac{3}{4}$	193.7-196.8	3.25	69.9	10,000*	86.2	35	750,000	340,909	20/40 Bauxite
9 $\frac{3}{4}$	244.5	3.75	95.3	10,000*	86.2	40	1,500,000	681,818	20/40 Bauxite
9 $\frac{3}{4}$	244.5	5.125	130.2	8,500	58.6	45	750,000	340,909	16/20 Carbolite

\* Differential Pressure Rating for treating is 12,500 psi

### REFERENCES

- ComPlete™ System data sheets (HST, RST, PST)
- Multi-position multiservice valve data sheet
- Screen communication system data sheet
- Intelligent well completion system data sheet

## ComPlete™ RST System

Superior Completion Services' patented **ComPlete™ Releasable Single-Trip (RST) System** allows the operator to perforate, and gravel pack or frac-pack zones of interest within a single-trip into the wellbore.

Guns are anchored into a previously set depth verification tool (DVT), allowing the GP/FP components to be released and placed at a safe distance from the perforating operations. This separation helps eliminate the transmission of mechanical shock loads and uses the fluid column to reduce the pressure wave from gun detonation, avoiding damaged packers, twisted screens, premature packer setting and other types of failures associated with perforating gun detonation.

### APPLICATIONS

- Ultra-deep completions
- Cased hole completions with sufficient sump area
- Critical fluid loss control completions
- Underbalanced and overbalanced perforating

### TECHNICAL DATA

Available Sizes	5 to 10 1/8 inch (127.0 to 257.2 mm)
Differential Pressure Rating	up to 12,500 psi (86.2 MPa)
Temperature Rating	350°F (177 °C)

### REFERENCES

- ComPlete™ system data sheets (FP, MST)
- CompSet™ packers data sheet
- Depth verification tool data sheet
- Flapper valves data sheet
- ISO isolation system data sheet
- Multi-position multi-service valve data sheet
- Multi-cycle on-off tool data sheet

### Features and Benefits

- Saves rig time
- Reduces fluid losses
- Eliminates need for a separate perforating run
- Eliminates logging trip to place gun on depth
- Eliminates the effects of mechanical shock loads at gun detonation
- Reduces pressure pulse at gun detonation
- Minimal rathole requirements, perforations plus approximately 30 ft (9.1m) below the DVT
- DVT run on wireline or tubing prior to the packer and gun assembly
- DVT released upon gun detonation
- Provides the standard **ComPlete FP System** capabilities
- May be integrated with interventionless production initiation systems

## ComPlete™ RST System: Operating Sequence

**Set Depth  
Verification  
Tool (DVT)**

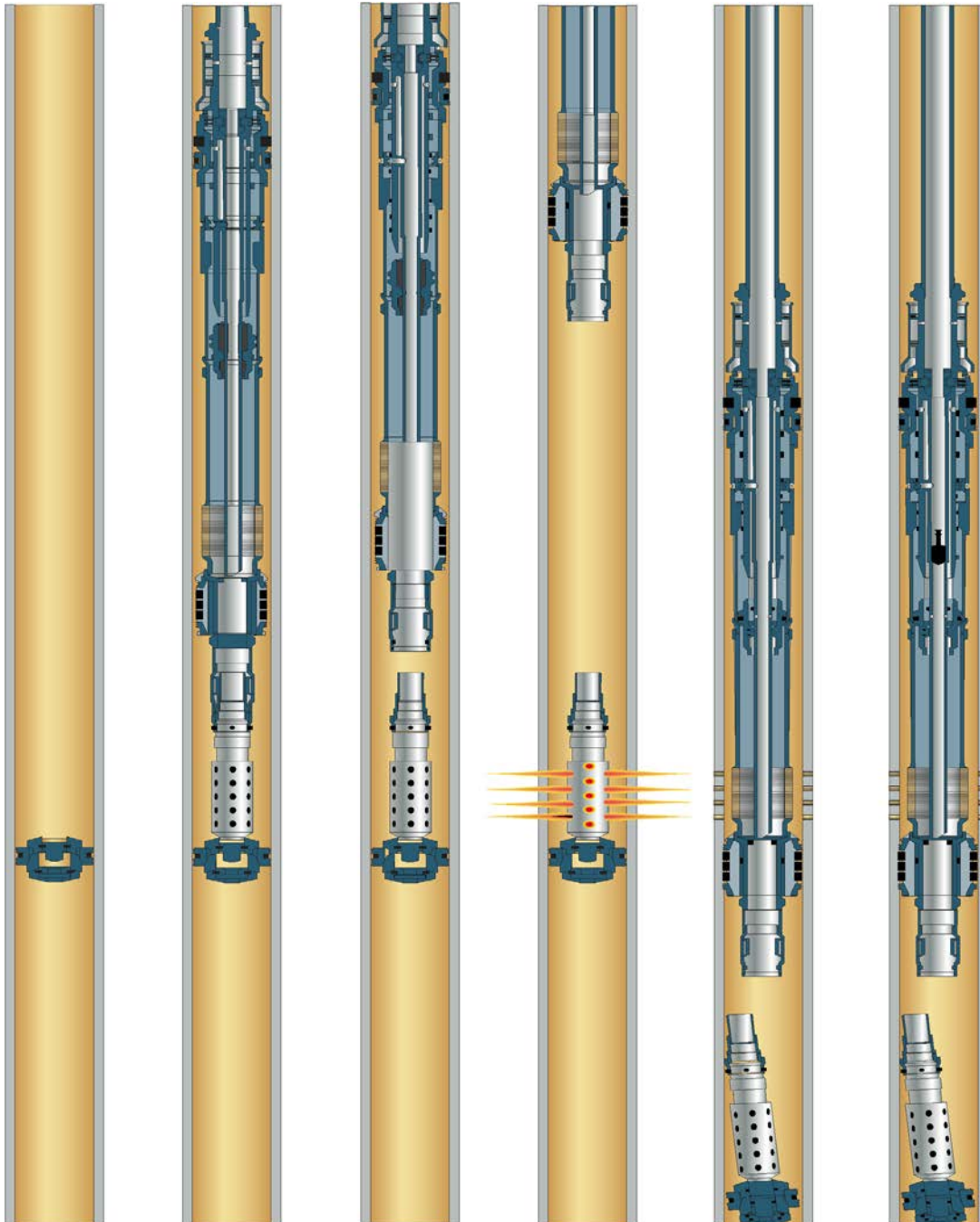
**Running  
Perforating/Gravel  
Pack Assembly**

**Disengage  
Gravel Pack  
Assembly**

**Reposition and  
Set Perforation  
Packer, Detonate  
Guns, Release  
DVT**

**Reposition  
Gravel Pack  
Assembly**

**Gravel Pack  
Frac-Pack**



## ComPlete™ PST System

Superior Completion Services' **ComPlete™ Production Single-Trip (PST) System** allows the perforating, and gravel pack or frac-pack of a single zone in a single-trip. With the **ComPlete™ PST System** the perforating guns and GP assembly are run into the wellbore on the production string. No service tools or work strings are required. This configuration allows the placement of a GP or FP in only the squeeze configuration. The system utilizes the same perforating gun and GP separation method as the **ComPlete™ RST System** to avoid possible issues with gun shock and pressure waves at the time of gun detonation.

### APPLICATIONS

- High-pressure wells
- Severely depleted wells
- Marginal wells

### TECHNICAL DATA

Available Sizes	5 to 10 1/8 in. (127.0 to 257.2 mm)
Differential Pressure Rating	up to 12,500 psi (86.2 MPa)
Temperature Rating	up to 350°F (177°C)

### Features and Benefits

- Saves rig time
- Reduces fluid losses
- Eliminates the need for service tools, work string and wash pipe
- Eliminates need for a separate perforating run
- Eliminates logging trip to place gun on depth
- Eliminates the effects of mechanical shock loads at gun detonation
- Multiple treating positions available: reverse and squeeze
- Minimal rathole requirements, perforations plus approximately 30 ft (9.1 m) below the DVT
- May be integrated with interventionless production initiation systems

### REFERENCES

ComPlete™ RST system data sheet

CompSet™ packers data sheet

Depth verification tool data sheet

Flapper valves data sheet

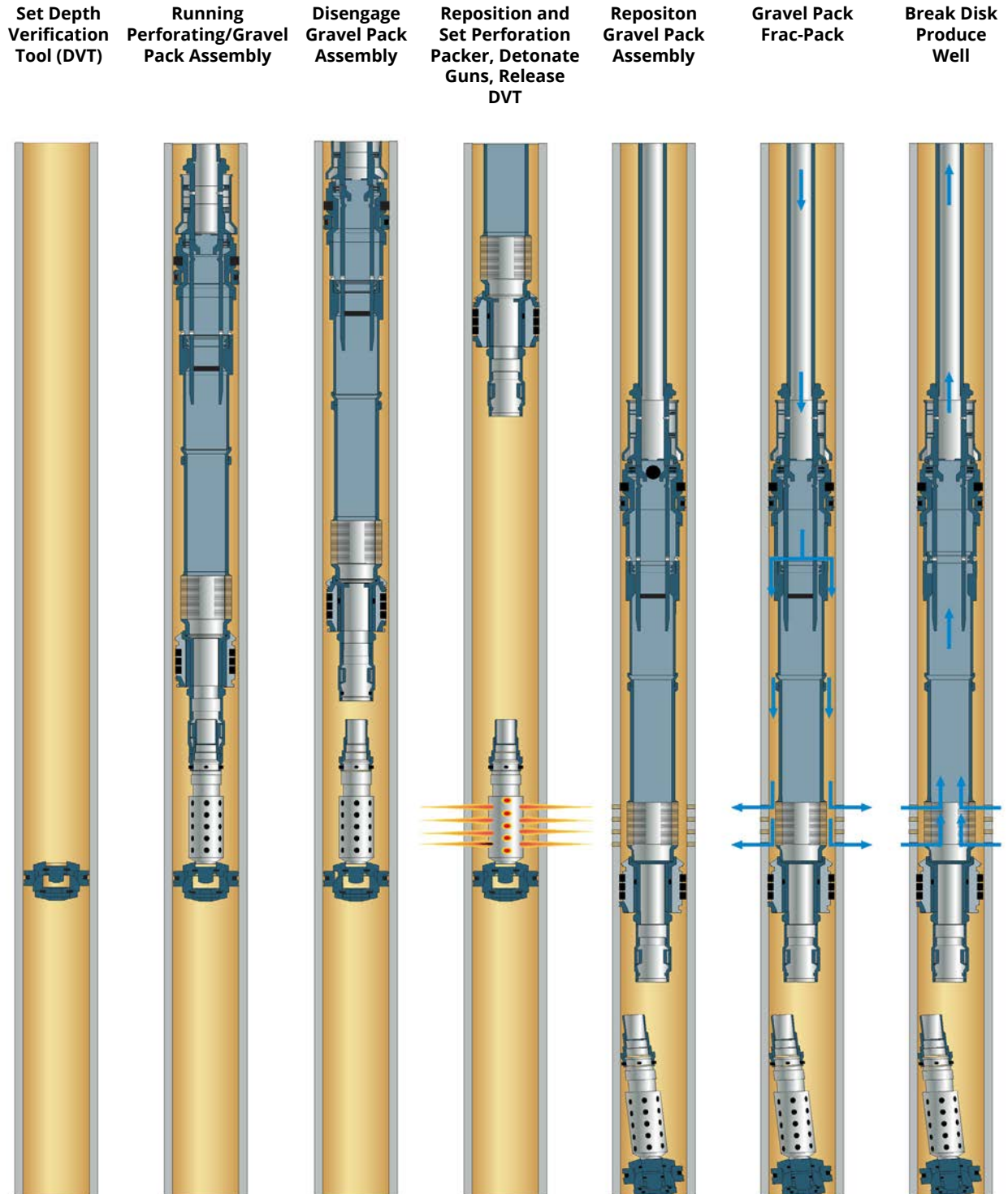
ISO isolation system data sheet

Multi-position multi-service valve data sheet

Multi-cycle on-off tool data sheet

Franklin, B., Daulton, D. and Farias, R. April 2009. Creating the Economics for Completion. Oilfield Technology: 3-6.

## ComPlete™ PST System: Operating Sequence





## ComPlete™ HST System

Superior Completion Services' patented **ComPlete™ Horizontal Single-Trip (HST) System** allows the washdown, frac or gravel pack, and stimulation of a horizontal, highly deviated or vertical well in a single-trip. The system can save rig time and reduce the potential for fluid loss to the formation.

The system provides real-time pressure monitoring during treatments to ensure optimum sand control and stimulation. It maintains well hydrostatic pressure and prevents any pressure surge on the formation. In addition, a variety of mechanical fluid loss devices may be utilized for well control after the treatment.

### APPLICATIONS

- Multizone completions
- Deepwater
- Zonal isolation
- Open or cased-hole wells
- Long horizontal, vertical or highly deviated wells

### TECHNICAL DATA

Available Sizes	7 to 13 3/8 in. (177.8 to 339.7 mm)
Differential Pressure Rating	up to 12,500 psi (86.2 MPa)
Temperature Rating	up to 350°F (177°C)

### Features and Benefits

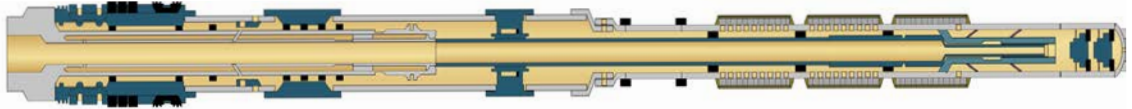
- Horizontal sand control and stimulation performed in a single-trip
- Potential rig time savings of up to 50%
- Provides the ability to selectively stimulate or clean up the sand controlled region
- Maintains well hydrostatic pressure on the formation
- Positive ball seat; no pressure surge on formation
- Reliable tool conversion to stimulation position (when stimulation is required)
- Standard circulating and squeeze position available
- Allows real-time pressure monitoring of sand control and stimulation treatments
- Multiple mechanical fluid loss devices available
- Reduces formation exposure time and potential reservoir damage
- Compatible with Superior Completion Services' UniFlo™ Inflow Control Device (ICD) screen systems

### REFERENCES

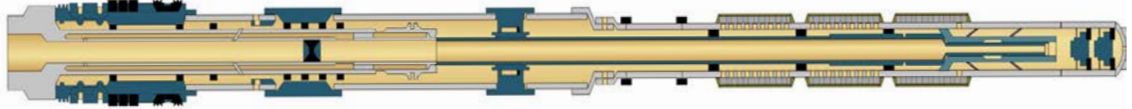
CompSet™ packers data sheet  
CompSet™ Ultra packer data sheet  
UniFlo ICD screens data sheet

## ComPlete™ HST System: Operating Sequence

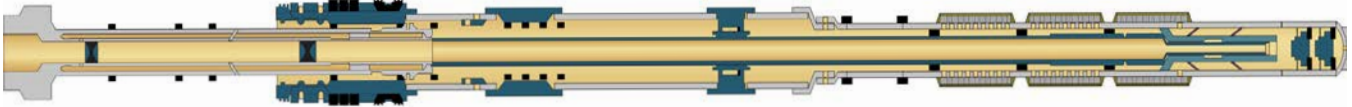
**RIH, Washdown**



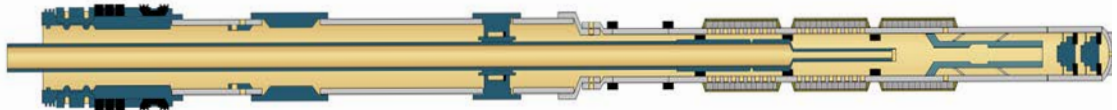
**Set Packer, Gravel Pack**



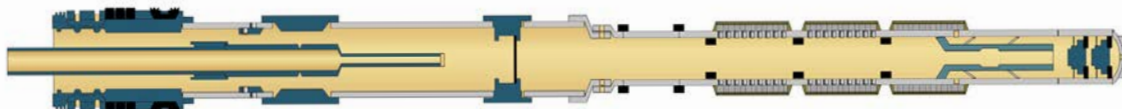
**Convert Tool**



**Stimulate Well**



**POOH, Isolate Well**



## MST: Decripler Sub

Superior Completion Services' **Decripler Sub** with sleeve test profile provides a temporary bottom to positively locate the service tool position during surface assembly. It then engages the end of the service tool to allow decripling of the open-only shifting tool. Once decripled, the device shears, which removes all restrictions and leaves a full open ID. The upper housing also contains a shearable sleeve profile that may be engaged by the open-only shifting tool to ensure proper operation. This profile shears down with minimal weight, allowing the shifting tool to pass through.

### APPLICATIONS

- Multizone completions

### Features and Benefits

- Allows opening tool to be run in the hole in a crippled position, preventing the opening of any sliding sleeves
- Provides full open ID once actuated
- Provides positive overpull indication of actuation
- Provides set-down indication of shifting tool function
- Hydraulic backup system exists in the event that the mechanical decripler fails to activate the opening tool
- Once the opening tool is activated, the service tool has full open ID for circulation

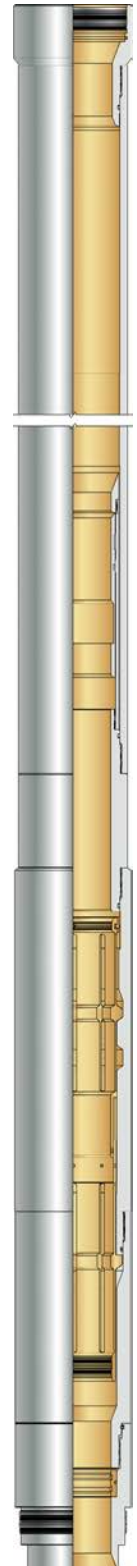
### TECHNICAL DATA

Available Sizes

7, 7 5/8 and 9 5/8 in. (177.8, 193.8 and 244.5 mm)

### REFERENCES

ComPlete™ MST System data sheet

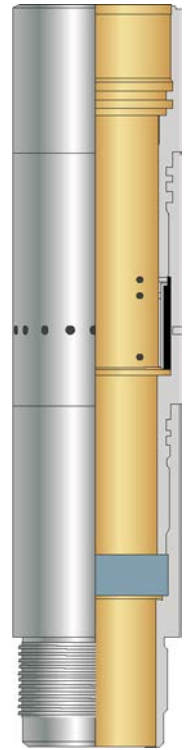


## MST: Disappearing Check Valve

Superior Completion Services' **Disappearing Check Valve** is utilized with the **ComPlete™ Multizone Single-Trip (MST) System** and enables the completion assembly to be pressure-tested during run-in. The valve contains a one-way check valve that allows the **ComPlete™ MST System** completion assembly to be filled with fluid during the run-in.

### APPLICATIONS

- Multizone completions



### Features and Benefits

- Allows pressure tension during assembly
- Glass disc pressure rating +/-2,500 psi (17.2 MPa)
- Provides full open ID after disc removal
- Allows tubing to fill during BHA makeup

### TECHNICAL DATA

Disappearing Check Valve					
Maximum OD		Minimum ID		Maximum OD	
inch	mm	inch	mm	inch	mm
3.95	100.3	2.92	74.0	1,500	10.3
5.97	151.5	4.63	117.5	2,300	15.9
5.96	151.3	4.79	121.7	2,000	13.8

### REFERENCES

ComPlete™ MST System data sheet

## MST: Multi-Profile Multi-Service Valve

Superior Completion Services' Multi-Profile Multi-Service Valve is a modified version of the standard multi-service valve. This production sliding sleeve utilizes the same robust nonelastomeric seal system and patented equalizing system. The multi-profile valve version is available with five different shifting profiles, allowing selective actuation. Corresponding shifting tools are available for use with slickline, wireline, coiled tubing or standard tubing.

### APPLICATIONS

- Multizone reservoirs
- Selective production and injection wells
- Zonal isolation

### Features and Benefits

- Proven non-elastomeric sealing technology
- Five selective profiles available
- Patented seal equalizing system
- May be actuated with slickline, electric line, coiled tubing or standard tubing
- Provides selective access for production and injection control
- Facilitates multizone single-trip completions
- Provides positive bidirectional zone isolation

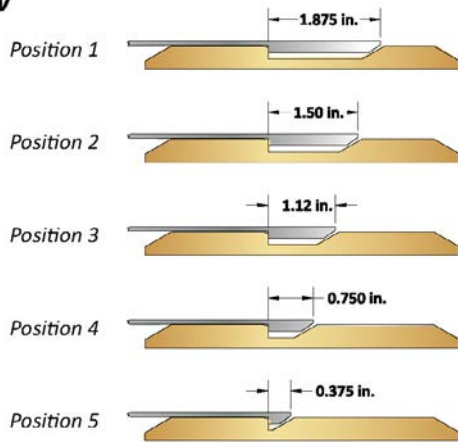


## MST: Multi-Profile Multi-Service Valve

### TECHNICAL DATA

#### Selective Profiles

#### Shallow



#### Deep

#### Multi-Profile Multi-Service Valve

Nominal Size		Minimum OD		Minimum ID		Tensile Yield Load		Collapse Pressure		Burst Pressure		ID Flow Area		Ported Body Flow Area	
inch	mm	inch	mm	inch	mm	lb	kg	psi	MPa	psi	MPa	in <sup>2</sup>	mm <sup>2</sup>	in <sup>2</sup>	mm <sup>2</sup>
3 ½	88.9	4.03	102.4	2.84	72.1	185,000	84,091	10,000	69	10,000	69	6.34	4,087.0	18.80	12,129.0
4	101.6	4.54	115.3	3.33	84.6	219,000	99,545	12,500	86	12,500	86	8.73	5,627.6	8.74	5,634.1
4 ½	114.3	5.05	128.3	3.83	97.3	250,000	113,636	10,000	69	10,000	69	11.52	7,432.9	25.45	16,419.3
7	177.8	6.66	169.2	5.28	134.0	324,156	147,344	10,000	69	10,000	69	21.85	14,099.3	29.17	18,819.3

#### REFERENCES

ComPlete™ MST System data sheet

## MST: Multi-Profile Shifting Tools

### MODIFIED MODEL B SHIFTING TOOL

Superior Completion Services' modified model B shifting tool is designed to shift Superior Completion's Multi-Profile Multi-Service Valve (MSV). Modifications include longer keys and modified springs to allow five-zone selectivity. Selective keys are available to shift sleeves from positions one through five. The shifting tool incorporates a standard shear-release mechanism found on the standard B shifting tool. The modified B shifting tool cannot be used with standard MSV assemblies.

### SHEARABLE COLLETED CT SHIFTING TOOL

Superior Completion Services' shearable colleted shifting tool is designed to shift Superior Completion's Multi-Profile Multi-Service Valve using coiled tubing. The collet is designed with a shearable release mechanism allowing it to be utilized in both the open and closed directions. It is available in positions one through five.

### NONSHEARABLE CT SHIFTING TOOL

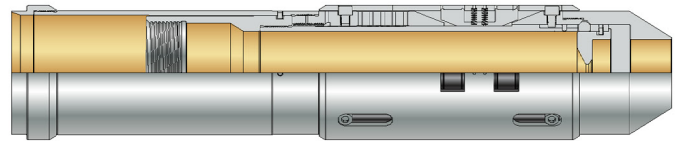
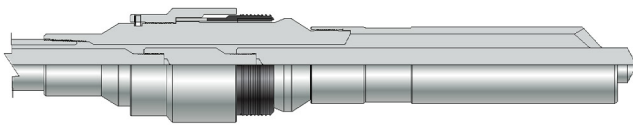
The nonshearable shifting tool is designed to run on coiled tubing and to selectively shift Superior Completion Services' position one through five Multi-Profile Multi-Service Valve. The valve does not contain a shear release feature and is only recommended for shifting valves in the downward direction.



## RST: Depth Verification Tools

### TECHNICAL DATA

RST: Depth Verification Tools							
Size		Weight Range		Maximum OD		Minimum ID	
inch	mm	lb	kg	inch	mm	inch	mm
5 x 2.68	127.0 x 68.1	11.5-21.4	5.2-9.7	3.95	100.3	2.735	69.5
5.5 x 2.68	139.7 x 68.1	13-23	5.9-10.5	4.465	113.4	1.985	50.4
7 x 3.25	177.8 x 82.6	17-29	7.7-13.2	5.94	150.9	2.94	74.7
7 x 3.25	177.8 x 82.6	29-41	13.2-18.6	5.63	143.0	3.22	81.8
7.625 x 3.25	193.7 x 82.6	29.7-39	13.5-17.7	6.439	163.6	2.94	74.7
9.625 x 3.25 - 4.75	244.5 x 82.6 -120.7	36-53.5	16.4-24.3	6.439	163.6	2.94	74.7



### REFERENCES

ComPlete™ System data sheets (PST, RST)



## RST: Multi-Cycle On-Off Tool

Superior Completion Services' **Multi-cycle On-Off Tool** is normally utilized with Superior Completion's **ComPlete™ Single-Trip Perforating and Gravel Pack Systems**. It is utilized between the perforating guns and the gravel pack assembly and provides a known break point between upper and lower assemblies. It also provides positive overpull weight indication to verify that the guns have fully released from the GP assembly.

### APPLICATIONS

- Deepwater
- Mature fields
- Standard completions

### Features and Benefits

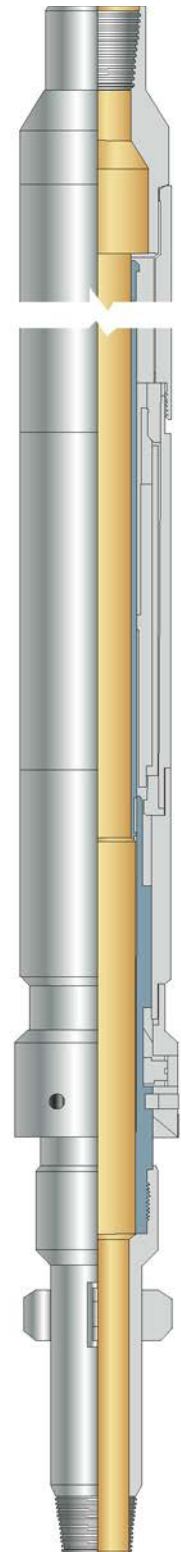
- Variable shear rate for initial release
- Multiple-acting J-latch for on-off pickup/set-down cycling of the tool
- Allows guns and GP assembly to be run in a single-trip
- Provides repeatable, positive overpull indication of release
- Relatchable for contingency operations

### TECHNICAL DATA

Multi-Cycle On-Off Tool							
Casing Size		Maximum OD		Minimum ID		Thread Connections	
inch	mm	inch	mm	inch	mm	inch	mm
5	127.0	3.95	100.3	1.95	49.5	2 3/8 EUE	60.3
5 1/2	139.7	4.32	109.6	1.95	49.5	2 3/8 EUE	60.3
7 3/4	196.9	5.53	140.5	2.43	61.7	2 7/8 EUE	73.0
9 5/8	244.5	6.03	153.2	2.43	61.7	2 7/8 EUE	73.0

### REFERENCES

ComPlete™ System data sheets (MST, PST, RST)



## HST: Pressure-Actuated Differential Valve

Superior Completion Services' **Pressure-Actuated, One-Way Flow, Differential Valve** is normally used in horizontal gravel pack operations. The valve is run in the closed position and is run inside a screen or wash pipe assembly. While running the horizontal gravel pack assembly into the well the valve remains closed and allows circulation to the bottom of the screens. During gravel pack pumping operations differential pressure cycles the valve to an open position for optimum sand placement across the screen section.

### APPLICATIONS

- Horizontal completions

### Features and Benefits

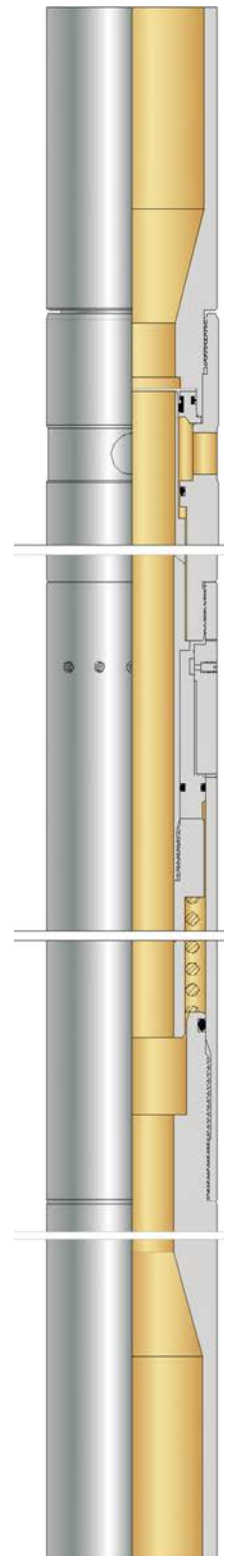
- ID to OD differential pressure actuation
- Adjustable initial opening pressure
- Low flowing pressure restriction

### TECHNICAL DATA

Available Size	4.0 in. OD x 1.9 in. ID (101.6 mm OD x 48.3 mm ID)
Differential Pressure Rating	10,000 psi (68.9 MPa)
Temperature Rating	350°F (177°C)

### REFERENCES

ComPlete™ HST System data sheets



## HST: Ball-Actuated Anti-Reversing Valve

Superior Completion Services' **Ball-Actuated Anti-Reversing Valve** is designed to allow the conversion of a full open ID assembly to a one-way fluid check valve. The valve may be positioned anywhere in the work string during initial run-in. To convert to a check valve, a ball is dropped from surface and tubing pressure is applied. The ball moves into a check position with a positive seat above, preventing flowback up the tubing string. It is most commonly used in acidizing long sections to allow breaking connections with lighter fluid in the tubing.

### APPLICATIONS

- Long-zone stimulation treatments
- Horizontal wells

### Features and Benefits

- Positive ball seat with 5,000 psi (34.5 MPa) differential rating
- Adjustable initial shear pressure
- Prevents tubing flowback during treating operations
- Eliminates the need for balanced pressure conditions prior to breaking connection

### TECHNICAL DATA

Available Size	6.1 in. OD x 2.74 in. ID (154.9 mm OD x 69.6 mm ID)
Differential Pressure Rating	10,000 psi (68.9 MPa)
Temperature Rating	300°F (148.9°C)

### REFERENCES

ComPlete™ HST System data sheets