# GRAVEL PACK AND FRAC-PACK SYSTEMS

- ComPlete™ FP System  
- ComPlete™ FPDZ System  
- ComPlete™ FP Anti-Swab System

## ACCESSORIES

- Molded-Seal Closing Sleeve

# SINGLE-TRIP SYSTEMS

- ComPlete™ MST System  
- ComPlete™ RST System  
- ComPlete™ PST System  
- ComPlete™ HST System

## ACCESSORIES

- Decrippler Sub  
- Disappearing Check Valve  
- Multi-Profile Multi-Service Valve  
- Multi-Profile Shifting Tools

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

- Pressure-Actuated Differential Valve  
- Ball-Actuated Anti-Reversing Valve
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Gravel Pack and Frac-Pack Systems
GRAVEL PACK AND FRAC-PACK SYSTEMS

ComPlete™ FP System 1
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ACCESSORIES

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ComPlete™ FP System

The Superior Completion Services ComPlete™ Frac-Pack (FP) System is a single-trip, single-zone, frac/gravel pack completion system. The system allows set-down weight to be applied in both squeeze and circulating positions to eliminate problems associated with tubing movement during the well treatment. It can be repeatedly cycled between the squeeze and circulating positions with minimal up and down movement of the work string. The system is simple in design and offers mechanical indications of all positions and tool movements. The service tool position is the same in the squeeze and circulating positions, minimizing the potential for erosion.

APPLICATIONS

- Conventional single-trip gravel and frac-packing
- Acid stimulation treatments
- Horizontal or vertical well displacements
- Conventional multizone stack-pack completions

**Features and Benefits**

- Hydraulic pressure release (tubing or annular) with contingency mechanical release
- True live annulus pressure monitoring in the weight-down circulating position
- Reverse circulation through wash pipe is possible in the circulating position for removal of pills, debris, etc.
- Ports are aligned in all treating positions
- Treating sleeve incorporates bonded production seals for maximum pressure integrity and reliability
- Isolation valve provides zonal isolation in reverse position
- Short overall length
ComPlete™ FPDZ System

The Superior Completion Services ComPlete™ Frac-Pack Deep-Zone (FPDZ) System is a frac-pack rated sand control placement technology. It is specially configured for deep completions where work string stretch and drag make downhole tool manipulation more challenging. The system offers extended tool length, increasing the acceptable range for reverse position. Dual collets on the service tool ensure positive manipulation of the circulating valve while picking up to reverse and provide a positive weight indication when the reverse position is achieved.

APPLICATIONS

• Ultra-deep completions
• Sand control
• Deepwater
• Highly deviated well trajectories

Features and Benefits

• Extended reverse position
• Dedicated circulating valve collet for controlling return flow
• Mechanical indication of reverse position
• Successful tool manipulation in ultra deep and highly deviated wellbores
• Resists unintentional closing of the circulating valve due to work string slingshot effect
• Hydraulic pressure release (tubing or annular) with redundant mechanical release
• True live annulus pressure monitoring in the circulating position
• Reverse circulation through wash pipe is possible in the circulating position for removal of pills, debris, etc.
• Ports are aligned in all treating positions
• Treating sleeve incorporates bonded production seals for maximum pressure integrity and reliability
• Isolation valve provides zonal isolation in reverse position

REFERENCES

CompSet™ Packers data sheet
CompSet™ Ultra packer data sheet
ComPlete™ FP Anti-Swab System

The Superior Completion Services ComPlete™ Frac-Pack Anti-Swab (ASW) System is a frac-pack stimulation tool technology designed for highly unconsolidated formations requiring sand-control treatment. The simple yet extremely effective tool design ensures that the wellbore hydrostatic is maintained on formation at all times while running in hole, during and after packer setting, spotting treatment, etc. It is specially configured for deepwater completions to overcome the drag and stretch related challenges endured by long work string in complicated wellbore trajectory. The service tool locates at the same spot on the packer for a weight-down frac or a true-squeeze position, overcoming confusion related to tool position. The extended nature of the tool provides enough room in reverse position during spotting or slurry reversal. This system consists of both proprietary and premium metal-to-metal for an absolute system integrity.

APPLICATIONS

- Ultra-deep completions
- Highly unconsolidated
- Deepwater
- Maintains hydrostatic on formation

Features and Benefits

- Proprietary and premium metal to metal connection
- Dedicated valve for anti-swab function using a controlled weep sub-system
- Positive surface indication of engagement during packer testing
- Effortless tool manipulation in challenging downhole environment and deviated wellbores
- Proprietary design to prevent sling shot during manipulating service tool downhole
- Hydraulic pressure release with secondary rotational release
- Positive isolation valve provides zonal isolation in reverse position
- Also consists of other features and benefits of the FPDZ System

REFERENCES

CompSet™ Packers data sheet
CompSet™ Extreme packer data sheet
# ComPlete™ FP System

## TECHNICAL DATA

<table>
<thead>
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<th>Casing Size</th>
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## ComPlete™ FP Extreme/ Anti-Swab System

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## ComPlete™ FP Ultra System

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* Tested with intermediate- and high strength proppant.

## REFERENCES

- CompSet™ Packers data sheet
- CompSet™ Ultra packer data sheet
Molded-Seal Closing Sleeve

The Superior Completion Services Molded-Seal (MS) Closing Sleeve is used in high-rate water packs, fracturing and stimulation in vertical or horizontal well completions. The unique port body and closing sleeve provides maximum proppant deployment and positive sealing after zonal treatment. The MS closing sleeve is assembled as a ComPlete™ Frac-Pack (FP) System with Superior Completion’s CompSet™ Packers.

APPLICATIONS

- Vertical or horizontal well completions
- High-rate water packs, fracturing and stimulation

Features and Benefits

- Large treatment ports
- Inverted molded seals for positive isolation
- Compatible with all ComPlete™ system packers
- Debris-tolerant design ensures complete sleeve closure after stimulation

TECHNICAL DATA

Pressure Rating 10,000 to 15,000 psi (68.9 to 103.4 MPa)
Temperature Rating Up to 350°F (177°C)

REFERENCES

ComPlete™ FP data sheet
CompSet™ Packers data sheet
CompSet™ Ultra packer data sheet
SECTION 2
Single-Trip Systems
## SINGLE-TRIP SYSTEMS

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ComPlete™ MST System

The 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)

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* 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

The 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 ⅛ 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

1. Set Depth Verification Tool (DVT)
2. Running Perforating/Gravel Pack Assembly
3. Disengage Gravel Pack Assembly
4. Reposition and Set Perforation Packer, Detonate Guns, Release DVT
5. Reposition Gravel Pack Assembly
6. Gravel Pack Frac-Pack
ComPlete™ PST System

The 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)

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

ComPlete™ PST System: Operating Sequence

1. Set Depth Verification Tool (DVT)
2. Running Perforating/Gravel Pack Assembly
3. Disengage Gravel Pack Assembly
4. Reposition and Set Perforation Packer, Detonate Guns, Release DVT
5. Reposition Gravel Pack Assembly
6. Gravel Pack Frac-Pack
7. Break Disk
8. Produce Well
ComPlete™ HST System

The 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

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

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)

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: Decripper Sub

The Superior Completion Services Decripper 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 decrizzling of the open-only shifting tool. Once decrilled, 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 decripper 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 ⅝ and 9 ⅝ in. (177.8, 193.8 and 244.5 mm)

REFERENCES

ComPlete™ MST System data sheet
MST: Disappearing Check Valve

The 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

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<tr>
<td><strong>Maximum OD</strong></td>
</tr>
<tr>
<td>inch</td>
</tr>
<tr>
<td>3.95</td>
</tr>
<tr>
<td>5.97</td>
</tr>
<tr>
<td>5.96</td>
</tr>
</tbody>
</table>

REFERENCES
ComPlete™ MST System data sheet
MST: Multi-Profile Multi-Service Valve

The 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**

<table>
<thead>
<tr>
<th>Position</th>
<th>Size</th>
<th>Minimum OD</th>
<th>Minimum ID</th>
<th>Tensile Yield Load</th>
<th>Collapse Pressure</th>
<th>Burst Pressure</th>
<th>ID Flow Area</th>
<th>Ported Body Flow Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 1</td>
<td>3 ½</td>
<td>88.9 mm</td>
<td>2.84 in.</td>
<td>185,000 lb</td>
<td>10,000 psi</td>
<td>6.34 in²</td>
<td>102.4 mm²</td>
<td>18.80 in²</td>
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<tr>
<td>Position 2</td>
<td>4</td>
<td>101.6 mm</td>
<td>3.33 in.</td>
<td>219,000 lb</td>
<td>12,500 psi</td>
<td>8.73 in²</td>
<td>115.3 mm²</td>
<td>25.45 in²</td>
</tr>
<tr>
<td>Position 3</td>
<td>4 ½</td>
<td>114.3 mm</td>
<td>3.83 in.</td>
<td>250,000 lb</td>
<td>10,000 psi</td>
<td>11.52 in²</td>
<td>128.3 mm²</td>
<td>29.17 in²</td>
</tr>
<tr>
<td>Position 4</td>
<td>7</td>
<td>177.8 mm</td>
<td>5.28 in.</td>
<td>324,156 lb</td>
<td>10,000 psi</td>
<td>21.85 in²</td>
<td>169.2 mm²</td>
<td>29.17 in²</td>
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<tr>
<td>Position 5</td>
<td></td>
<td></td>
<td>0.750 in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Deep**

REFERENCES

ComPlete™ MST System data sheet
MST: Multi-Profile Shifting Tools

MODIFIED MODEL B SHIFTING TOOL
The 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
The 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

<table>
<thead>
<tr>
<th>Size</th>
<th>Weight Range</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch</td>
<td>mm</td>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td>5 x 2.68</td>
<td>127.0 x 68.1</td>
<td>11.5-21.4</td>
<td>3.95</td>
</tr>
<tr>
<td>5.5 x 2.68</td>
<td>139.7 x 68.1</td>
<td>13-23</td>
<td>4.465</td>
</tr>
<tr>
<td>7 x 3.25</td>
<td>177.8 x 82.6</td>
<td>17.29</td>
<td>5.94</td>
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<td>7 x 3.25</td>
<td>177.8 x 82.6</td>
<td>29-41</td>
<td>5.63</td>
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<tr>
<td>7.625 x 3.25</td>
<td>193.7 x 82.6</td>
<td>29.7-39</td>
<td>6.439</td>
</tr>
<tr>
<td>9.625 x 3.25 - 4.75</td>
<td>244.5 x 82.6 -120.7</td>
<td>36-53.5</td>
<td>6.439</td>
</tr>
<tr>
<td>mm</td>
<td>lb</td>
<td>kg</td>
<td>inch</td>
</tr>
<tr>
<td>100.3</td>
<td>11.5-21.4</td>
<td>5.2-9.7</td>
<td>3.95</td>
</tr>
<tr>
<td>113.4</td>
<td>13-23</td>
<td>5.9-10.5</td>
<td>4.465</td>
</tr>
<tr>
<td>150.9</td>
<td>17.29</td>
<td>7.7-13.2</td>
<td>5.94</td>
</tr>
<tr>
<td>143.0</td>
<td>29-41</td>
<td>13.2-18.6</td>
<td>5.63</td>
</tr>
<tr>
<td>163.6</td>
<td>29.7-39</td>
<td>13.5-17.7</td>
<td>6.439</td>
</tr>
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<td>163.6</td>
<td>36-53.5</td>
<td>16.4-24.3</td>
<td>6.439</td>
</tr>
</tbody>
</table>

**REFERENCES**

ComPlete™ System data sheets (PST, RST)
RST: Multi-Cycle On-Off Tool

The 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

<table>
<thead>
<tr>
<th>Casing Size</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
<th>Thread Connections</th>
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<tbody>
<tr>
<td></td>
<td>inch</td>
<td>mm</td>
<td>inch</td>
</tr>
<tr>
<td>5</td>
<td>3.95</td>
<td>100.3</td>
<td>1.95</td>
</tr>
<tr>
<td>5 ½</td>
<td>4.32</td>
<td>109.6</td>
<td>1.95</td>
</tr>
<tr>
<td>7 ¾</td>
<td>5.53</td>
<td>140.5</td>
<td>2.43</td>
</tr>
<tr>
<td>9 ¾</td>
<td>6.03</td>
<td>153.2</td>
<td>2.43</td>
</tr>
</tbody>
</table>

REFERENCES

ComPlete™ System data sheets (MST, PST, RST)
HST: Pressure-Actuated Differential Valve

The 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

The 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
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FLUID LOSS AND ZONAL ISOLATION SYSTEM

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ISO Isolation System

The Superior Completion Services patented ISO Isolation System eliminates fluid loss to the formation after a gravel or frac-pack treatment by placing an internal isolation string across a production screen. The system provides selective production capabilities controlled by a mechanically or hydraulically actuated sleeve placed in the isolation string.

APPLICATIONS

- Zonal isolation
- Single or selective multizone completions
- Fluid loss control
- Selective production
- Sand control
- Shallow to deepwater wells
- Vertical or highly deviated wells

- Eliminates post-treatment fluid loss and aids in well control
- Provides selective production capability
- All installation is done at the surface
- Gravel pack operations are not compromised
- Post-treatment fluid loss pills are not required
- No extra trips to install isolation assemblies are needed
- Allows the integrity of the assembly to be pressure tested prior to coming out of the wellbore with service tools
- Provides bidirectional zonal isolation
ISO Isolation System

TECHNICAL DATA

Available in tubing sizes from 2 1/16 to 4 1/2 in. (52.9 to 114.3 mm) isolation tubing sizes. Other sizes available upon request.

<table>
<thead>
<tr>
<th>Casing OD</th>
<th>Packer Bore</th>
<th>Screen Size</th>
<th>Isolation String</th>
<th>Screen Wrapped</th>
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<tr>
<td></td>
<td></td>
<td>Base Pipe</td>
<td>Jacket OD</td>
<td>Pipe OD</td>
</tr>
<tr>
<td>inch</td>
<td>mm</td>
<td>inch</td>
<td>mm</td>
<td>inch</td>
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<td>5.50</td>
<td>139.0</td>
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<td>5.50</td>
</tr>
</tbody>
</table>

REFERENCES
Annular flow valve data sheet
Multi-service valve data sheet
Pressure-actuated circulating valve data sheet
Radial flow valve data sheet
HPR Isolation System

The Superior Completion Services hydraulically powered, retrievable (HPR) Isolation System is mechanically actuated to provide formation isolation after gravel or frac-packing. The system uses well hydrostatic pressure to position the isolation string across the production interval. Valve manipulation is not necessary during the job and wash pipe is not required for gravel packing. The HPR system is compatible with standard equipment and can be run with mechanically or hydraulically actuated isolation and production sleeves.

APPLICATIONS

• Zonal isolation
• Single or selective multizone completions
• Fluid loss control

Features and Benefits

• Set-down weight not required to position isolation string
• Eliminates fluid loss and aids in well control
• Simple, straight pickup to actuate
• Debris-resistant design
• Selectively retrievable
• Provides bidirectional zonal isolation
• Eliminates need for wash pipe
HPR Isolation System

TECHNICAL DATA

Available in 2 1/16 to 4 1/2 in. (52.9 to 114.3 mm) isolation tubing sizes
Other sizes available upon request

<table>
<thead>
<tr>
<th>Casing OD</th>
<th>Packer Bore</th>
<th>Screen Size</th>
<th>Isolation String</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch/mm</td>
<td>inch/mm</td>
<td>Base Pipe</td>
<td>Jacket OD</td>
</tr>
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<td></td>
<td></td>
<td>Pipe OD</td>
<td>MSV Size</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MSV ID</td>
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</tr>
</tbody>
</table>

**REFERENCES**

ComPlete™ FP System data sheet
Multi-service valve data sheet
Pressure-actuated circulating valve data sheet
Interventionless Isolation System

The Superior Completion Services Interventionless Isolation System facilitates optimal formation treatment and gravel placement by achieving positive, selective, post-treatment zonal isolation without the use of wash pipe or mechanical shifting tools.

The system is compatible with Superior Completion Services’ patented pressure-actuated isolation valves that allow wells to be placed on production without mechanical intervention. Eliminating the need for wash pipe and shifting tools reduces operational risks, as well as initial installation costs and rig time required for deployment. Gravel pack circulation is accomplished through a mechanical sleeve located at the bottom of the production screen. Once the job is completed, an actuation ball is released from the service tool closing the circulation sleeve and isolating the completion. Later, conventional production sliding sleeves are opened for production.

APPLICATIONS

• Zonal isolation
• Single or selective multizone completions

Features and Benefits

• Does not require wash pipe or shifting tools
• Provides optimum fluid loss protection and zonal isolation
• Can use mechanical or hydraulic sliding sleeves for production
• Soft-actuating valves eliminate pressure surges to the formation
Interventionless Isolation System

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Screen Size</th>
<th>Isolation String OD</th>
<th>Isolation Sleeve ID</th>
<th>Compatible Packer Bore ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch</td>
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<td>inch</td>
<td>mm</td>
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<tr>
<td>4.00</td>
<td>101.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The tool is compatible with all current Superior Completion Services' zone isolation valves, including the mechanical multi-service valve, pressure-actuated circulating valve, annular flow valve and radial flow valve.

REFERENCES
Multi-service valve data sheet
Pressure-actuated circulating valve data sheet
Annular flow valve data sheet
Radial flow valve data sheet
Flapper Valves

The Superior Completion Services **Flapper Valves** are uniquely designed to combine optimum fluid loss protection with the ability to easily remove the flapper material. Flappers utilize frangible glass or ceramic materials to withstand high pressure differentials and still provide easy mechanical breakup.

**APPLICATIONS**

- Fluid loss control
- Provides optimum fluid loss protection
- Withstands high pressure differentials
- Provides easy mechanical breakup
- Optional hydraulic breakup
- Provides one-way zonal isolation
- Dual flapper valve is available for severe fluid loss applications
- Optional eccentric design for maximum ID

**TECHNICAL DATA**

Flapper differential pressure capability ranges from 2,500 to 4,000 psi (17.2 to 27.6 MPa) depending on the size and material selected.

Standard temperature rating 250°F (121°C)
Maximum temperature rating 350°F (177°C)

<table>
<thead>
<tr>
<th>Casing Size</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
<th>Compatible Packer Bore ID</th>
</tr>
</thead>
<tbody>
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<td>7.015</td>
<td>4.393 111.58 4.645 117.98 6 152.4</td>
</tr>
</tbody>
</table>

5 - 5 5\/16 6 1/8 7 7 5\/8 9 5\/8
Multi-Service Valve

The Superior Completion Services Multi-Service Valve provides zonal isolation and full-bore completion control. Communication can be easily established with conventional B or BO shifting tools or special coiled tubing shifting tools. The special slimline OD allows the valve to be run inside of the screen or liner assemblies while still maintaining optimum flow areas. The valve is available with both a standard and a selective profile allowing multiple valve usage in the same wellbore.

APPLICATIONS

- Both gravel pack and non-gravel pack installations
- Selective production
- Pre- and post-treatment zonal isolation

Features and Benefits

- Includes wireline-landing nipple profile above and packing bore below the valve mechanism for testing and contingency isolation
- Circulation ports have a larger flow area than the landing nipple and packing bore, which produces lower velocities and pressure drops across the ports
- Standard model B or BO shifting tools can be used to open and close the valve
- A special coiled tubing shifting tool is available with pump-through and bypass features
- Proprietary non-elastomeric packing provides excellent resistance to harsh chemical environments and high differential pressures
- Equalizing ports prevent damage to packing seals during valve opening
- Design certification includes differentially cycled 5,000 psi (34.5 MPa) with gas, 50 cycles at 250°F (121°C) testing
- Valve can be run in type-O (opens down) or type-A (opens up) configurations
- May also be actuated with special hydraulic shifting tools or wireline tractor systems
## Multi-Service Valve (MSV)

### TECHNICAL DATA

<table>
<thead>
<tr>
<th>Nominal OD</th>
<th>Minimum OD</th>
<th>Packing Bore Diameter</th>
<th>Tensile Yield Load</th>
<th>Differential Pressure Rating</th>
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<td></td>
<td></td>
<td>inch</td>
<td>mm</td>
<td>inch</td>
</tr>
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<td>60.3</td>
<td>2.71</td>
<td>68.8</td>
<td>1.88</td>
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<td>3 ¾&quot;</td>
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<td>4 ½&quot;</td>
<td>88.9</td>
<td>3.97</td>
<td>100.7</td>
<td>2.81</td>
</tr>
</tbody>
</table>

### REFERENCES

- PX profile nipple data sheet
- PR profile nipple data sheet
- Model B/Model BO shifting tools data sheet

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**COMPLETION TOOLS CATALOG**

SECTION 3: Fluid Loss and Zonal Isolation System

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Model B Shifting Tool

The Superior Completion Services Model B Shifting Tool is designed to selectively locate and shift most sliding sleeves and/or tubing-conveyed perforating (TCP) disconnect subs. This is accomplished by the tool’s keys engaging the inner sleeve; depending on the direction that the tool requires (up or down), the sleeve is shifted.

Model BO Shifting Tool

The Superior Completion Services Model BO Shifting Tool is designed to selectively locate and shift sliding sleeves only to the down position. The tool is converted to seeking mode by locating on the lower locating keys.

APPLICATIONS

• Any application where selective actuation of sliding sleeves is needed
• Actuating disconnect sub-applications
• Wells assisted by sucker-rod pumps

Features and Benefits

• Selectively locates and shifts most sliding sleeves and/or TCP disconnect subs
# Model B / Model BO Shifting Tools

## Technical Data

<table>
<thead>
<tr>
<th>Size</th>
<th>Fish Neck OD</th>
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<th>OD (Keys Retracted)</th>
<th>OD (Keys Expanded)</th>
</tr>
</thead>
<tbody>
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<td>mm</td>
<td>inch</td>
<td>mm</td>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td>1 ¼</td>
<td>31.8</td>
<td>1.000</td>
<td>25.4</td>
<td>¼ - 11</td>
<td>15.8 - 279.0</td>
</tr>
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<td>⁷⁄₈ - 10</td>
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<tr>
<td>1 ⅛</td>
<td>41.3</td>
<td>1.188</td>
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<td>⁷⁄₈ - 10</td>
<td>23.8 - 254.0</td>
</tr>
<tr>
<td>1 ⅜</td>
<td>43.4</td>
<td>1.188</td>
<td>30.2</td>
<td>⁷⁄₈ - 10</td>
<td>23.8 - 254.0</td>
</tr>
<tr>
<td>1 ⅝</td>
<td>45.2</td>
<td>1.375</td>
<td>34.9</td>
<td>⁷⁄₈ - 10</td>
<td>23.8 - 254.0</td>
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<tr>
<td>1 ⅞</td>
<td>47.6</td>
<td>1.375</td>
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<td>⁷⁄₈ - 10</td>
<td>23.8 - 254.0</td>
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<tr>
<td>2 ¼</td>
<td>54.0</td>
<td>1.375</td>
<td>34.9</td>
<td>⁷⁄₈ - 10</td>
<td>23.8 - 254.0</td>
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<td>1.750</td>
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<td>58.8</td>
<td>⁷⁄₈ - 10</td>
<td>17.5 - 254.0</td>
</tr>
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<tr>
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<td>54.0</td>
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### Model B Shifting Tool

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<th>OD (Keys Expanded)</th>
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<td>inch</td>
<td>mm</td>
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<td>44.5</td>
<td>⁷⁄₈ - 10</td>
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<td>58.8</td>
<td>⁷⁄₈ - 10</td>
<td>26.9 - 254.0</td>
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<tr>
<td>2 ⁵⁄₈</td>
<td>71.5</td>
<td>2.813</td>
<td>58.8</td>
<td>⁷⁄₈ - 10</td>
<td>26.9 - 254.0</td>
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</table>
Pressure-Actuated Circulating Valve

The Superior Completion Services patented **Pressure-Actuated Circulating (PAC) Valve** provides complete isolation of the productive interval during all phases of completion operations. The PAC valve operates hydraulically and requires no mechanical well intervention to initiate production. Once actuated, the valve provides a full-open flow path into the production tubing. Actuation is initiated by applying differential pressure from valve ID to OD. Initial actuation pressure unlocks the valves while maintaining pressure integrity (this patented PAC valve actuation method allows multiple valves to be in the same pressure cycle). Reducing the actuation pressure to equal the annular pressure allows the valve to cycle to the full open position.

**APPLICATIONS**

- Interventionless zonal isolation and production initiation
- Fluid loss control
- Deviated wellbores
- Completion designs with limited tubing ID access
- Intelligent and multizone completions

**Features and Benefits**

- Optimized flow areas for maximum production
- Interventionless actuation reduces operational risk and overall cost of completion
- Balanced design prevents premature actuation until seals are in place
- Provides positive bidirectional zonal isolation
- Redundant lock open system
- Unlocked position maintains pressure integrity
- Can be used in 5 to 10 3/4 in. (127.8 to 273.1 mm) casing sizes
- Tubing-pressure actuated
- Ideal for use in deepwater intelligent completions where mechanical access is limited
# Pressure-Actuated Circulating Valve

## Technical Data

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<tr>
<th>Tubing Size</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
<th>Temperature Rating</th>
<th>Differential Pressure Rating</th>
<th>Shifting Profile</th>
<th>Nominal Shear Range</th>
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<td>mm</td>
<td>inch</td>
<td>mm</td>
<td>°F</td>
<td>°C</td>
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</table>

## References

- ComPlete™ System data sheets (FP, FPDZ, HST)
- HPR Isolation System data sheet
- ISO Isolation System data sheet
- Screen-wrapped sleeves data sheet
Reclosable Pressure-Actuated Circulating (X-PAC) Valve

The Superior Completion Services patented X-PAC Valve provides complete isolation of the productive interval during completion operations. The X-PAC valve operates hydraulically and requires no mechanical well intervention to initiate production. The X-PAC valve provides the added benefit of being reclosable to isolate the productive interval.

Once actuated, the valve provides a full-open flow path into the production tubing. Actuation is initiated by applying differential pressure from valve ID to OD. Initial actuation pressure unlocks the valves while maintaining pressure integrity (this patented valve actuation method allows multiple PAC valves to be in the same pressure cycle). Reducing the actuation pressure to equal the annular pressure allows the valve to cycle to the full open position.

APPLICATIONS

- Interventionless zonal isolation and production initiation
- Fluid loss control
- Deviated wellbores
- Completion designs with limited tubing ID access
- Intelligent and multizone completions
- Post-completion zonal isolation

Features and Benefits

- Optimized flow areas for maximum production
- Interventionless actuation reduces operational risk and overall cost of completion
- Mechanical backup profile with compatible shifting tool
- Mechanically reclosable to provide an isolation barrier
- Provides positive bidirectional zonal isolation
- Unlocked position maintains pressure integrity
- Can be used in 7 to 10 3/4 in. (177.8 to 273.1 mm) casing sizes
- Tubing-pressure actuated
- Ideal for use in deepwater intelligent completions where mechanical access is limited
Reclosable Pressure-Actuated Circulating (X-PAC)

**TECHNICAL DATA**

Temperature rating 250°F (121°C)

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<th>Minimum ID</th>
<th>Frac Mode Pressure Rating</th>
<th>Differential Pressure Rating</th>
<th>Nominal Shear Range</th>
<th>B Shifting Profile</th>
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<td>inch</td>
<td>mm</td>
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<td>58.8</td>
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<td></td>
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<td>6.64</td>
<td>168.7</td>
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<td></td>
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</tr>
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<td>6.64</td>
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<td>6.3-44.5</td>
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**REFERENCES**

- ComPlete™ System data sheets (FP, FPDZ, HST)
- HPR Isolation System data sheet
- ISO Isolation System data sheet
- Screen-wrapped sleeves data sheet
Radial Flow Valve

The Superior Completion Services patented Radial Flow Valve is used to provide selective isolation of a flow path between the annular area created by a concentric isolation string inside the screen and liner assembly and the ID of the concentric isolation string. The valve is in the closed position and run-in to provide positive isolation.

The valve is opened hydraulically by pressuring up on the tubing ID to create a differential, from the valve ID to the valve OD. At a predetermined pressure differential, the valve will shift to an unlocked condition. Returning the pressure across the valve to a near-balanced condition allows the valve to move to the open position, permitting flow into the production tubing.

The valve is commonly used to isolate the lower zone of a dual completion or the lower zone of a intelligent well completion.

APPLICATIONS

• Interventionless zonal isolation and production initiation
• Fluid loss control
• Deviated wellbores
• Completion designs with limited tubing ID access
• Intelligent and multizone completions

Features and Benefits

• Optimized flow areas for maximum production
• Interventionless actuation reduces operational risk and overall cost of completion
• Balanced design prevents premature actuation until seals are in place
• Provides positive bidirectional zonal isolation
• Redundant lock open system
• Unlocked position maintains pressure integrity
• Can be used in 7 to 10 3/4 in. (177.8 to 273.1 mm) casing sizes
• Tubing-pressure actuated
• Ideal for use in deepwater intelligent completions where mechanical access is limited
Radial Flow Valve

**TECHNICAL DATA**

Available in 6-, 10-, 20-, 30- and 40-ft (1.8-, 3.0-, 6.1-, 9.1- and 12.2-m) sealbore lengths

Temperature rating 350°F (177°C)

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<th>Sealbore Size (inch mm)</th>
<th>Shear Range (psi MPa)</th>
<th>Differential Pressure Rating (psi MPa)</th>
<th>Type B Shifting Profile</th>
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<td>15,000 103.4</td>
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* Pressure rating 15,000 psi (103.42 MPa).

**REFERENCES**

ComPlete™ system data sheets (FP, FPDZ)
ISO isolation system data sheet
Intelligent well completion system data sheet
Reclosable Annular Flow Valve (X-AFV™)

The Superior Completion Services patented Reclosable Annular Flow Valve (X-AFV™) system is used to isolate a concentric flow path created between the isolation string inside the screen and blank assembly. This valve can also help maintain zonal isolation during production installation without being pressure sensitive.

The X-AFV is utilized in the upper interval of a multizone completion to provide positive isolation after stimulation treatments have been completed. The valve is hydraulically actuated by creating a pre-set ID to OD differential across the actuating piston. The valve includes a balancing feature, which prevents treating pressure from prematurely shearing and shifting the actuating piston until the production seals are landed. Formation pressure has no effect on valve actuation.

The valve is commonly used to isolate the upper zone of a dual completion or the upper zone of an intelligent well completion.

APPLICATIONS

• Interventionless zonal isolation and production initiation
• Fluid loss control
• Deviated wellbores
• Completion designs with limited tubing ID access
• Intelligent and multizone completions
• Post-completion zonal isolation

Features and Benefits

• Optimized flow areas for maximum production
• Interventionless actuation reduces operational risk and overall project cost
• Mechanical backup profile with compatible shifting tool
• Mechanically reclosable to provide an isolation barrier
• Balanced design prevents premature actuation until seals are in place
• Provides positive bidirectional zonal isolation
• Unlocked position maintains pressure integrity
• Can be used in 7 to 10 3/4 in. (177.8 to 273.1 mm) casing sizes
• Tubing-pressure actuated
• Ideal for use in deepwater intelligent completions where mechanical access is not possible
Reclosable Annular Flow Valve (X-AFV™)

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Nominal OD</th>
<th>Minimum ID</th>
<th>Flow Area Through Valve</th>
<th>Flow Area Through ID</th>
<th>Sealbore Size</th>
<th>Frac Mode Pressure</th>
<th>Temperature Rating</th>
<th>Nominal Shear Range</th>
<th>Type B Shifting Profile</th>
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<tr>
<td>inch</td>
<td>mm</td>
<td>inch</td>
<td>cm²</td>
<td>inch</td>
<td>cm²</td>
<td>inch</td>
<td>mm</td>
<td>psi</td>
</tr>
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<td>2.81</td>
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<td>130.8</td>
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</tr>
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</table>

REFERENCES
- ComPlete™ system data sheets (FP, FPDZ)
- ISO isolation system data sheet
- Intelligent well completion system data sheet
Annular Flow Valve

The patented Annular Flow Valve is used to isolate a concentric flow path normally created between the inner concentric production tubing and an outer screen and blank assembly.

The Annular Flow Valve is utilized in the upper interval of a multizone completion to provide positive isolation after stimulation treatments have been completed. The valve is hydraulically actuated by creating a pre-set ID to OD differential across the actuating piston. The valve includes a balancing feature, which prevents treating pressure from prematurely shearing and shifting the actuating piston until the production seals are landed. Formation pressure has no affect on valve actuation.

The valve is commonly used to isolate the upper zone of a dual completion or the upper zone of an intelligent well completion.

APPLICATIONS

- Interventionless zonal isolation and production initiation
- Fluid loss control
- Deviated wellbores
- Completion designs with limited tubing ID access
- Intelligent and multizone completions
- Post-completion zonal isolation

Features and Benefits

- Optimized flow areas for maximum production
- Interventionless actuation reduces operational risk and overall project cost
- Balanced design prevents premature actuation until seals are in place
- Provides positive bi-directional zonal isolation
- Redundant lock open system
- Unlocked position maintains pressure integrity
- Can be used in 7 to 10 3/4 in. (177.8 to 273.1 mm) casing sizes
- Tubing-pressure actuated
- Ideal for use in deepwater intelligent completions where mechanical access is not possible
Annular Flow Valve

TECHNICAL DATA
Available in 10-, 20-, 30- and 40-ft (3.0-, 6.1-, 9.1- and 12.2-m) sealbore lengths

<table>
<thead>
<tr>
<th>Nominal OD</th>
<th>Minimum ID</th>
<th>Flow Area Through Valve</th>
<th>Flow Area Through ID</th>
<th>Sealbore Size</th>
<th>Frac Mode Pressure</th>
<th>Temp Rating</th>
<th>Differential Pressure</th>
<th>Nominal Shear Range</th>
<th>Type B Shifting Profile</th>
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</thead>
<tbody>
<tr>
<td>inch</td>
<td>mm</td>
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<td>mm</td>
<td>inch</td>
<td>psi</td>
<td>°F</td>
<td>psi</td>
<td>psi</td>
<td>inch/cm</td>
</tr>
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<td>6.40</td>
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<td>350</td>
<td>916-6,411</td>
</tr>
</tbody>
</table>

12,500 psi (86.1 MPa) frac mode available.

REFERENCES
ComPlete™ system data sheets (FP, FPDZ)
ISO isolation system data sheet
SHARP well completion system data sheet
Reclosable Annular Flow Valve (X-AFV™)

The Superior Completion Services patented Reclosable Annular Flow Valve (X-AFV™) system is used to isolate a concentric flow path created between the isolation string inside the screen and blank assembly. This valve can also help maintain zonal isolation during production installation without being pressure sensitive.

The X-AFV is utilized in the upper interval of a multizone completion to provide positive isolation after stimulation treatments have been completed. The valve is hydraulically actuated by creating a pre-set ID to OD differential across the actuating piston. The valve includes a balancing feature, which prevents treating pressure from prematurely shearing and shifting the actuating piston until the production seals are landed. Formation pressure has no effect on valve actuation.

The valve is commonly used to isolate the upper zone of a dual completion or the upper zone of an intelligent well completion.

APPLICATIONS

- Interventionless zonal isolation and production initiation
- Fluid loss control
- Deviated wellbores
- Completion designs with limited tubing ID access
- Intelligent and multizone completions
- Post-completion zonal isolation

Features and Benefits

- Optimized flow areas for maximum production
- Interventionless actuation reduces operational risk and overall project cost
- Mechanical backup profile with compatible shifting tool
- Mechanically reclosable to provide an isolation barrier
- Balanced design prevents premature actuation until seals are in place
- Provides positive bidirectional zonal isolation
- Unlocked position maintains pressure integrity
- Can be used in 7 to 10 3/4 in. (177.8 to 273.1 mm) casing sizes
- Tubing-pressure actuated
- Ideal for use in deepwater intelligent completions where mechanical access is not possible
Reclosable Annular Flow Valve (X-AFV™)

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Nominal OD</th>
<th>Minimum ID</th>
<th>Flow Area Through Valve</th>
<th>Flow Area Through ID</th>
<th>Sealbore Size</th>
<th>Frac Mode Pressure</th>
<th>Temperature Rating</th>
<th>Nominal Shear Range</th>
<th>Type B Shifting Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch/mm</td>
<td>inch:mm</td>
<td>inch²/cm²</td>
<td>inch²/cm²</td>
<td>inch/mm</td>
<td>psi/MPa</td>
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<td>2.56/65.0</td>
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</table>

**REFERENCES**

ComPlete™ system data sheets (FP, FPDZ)
ISO isolation system data sheet
Intelligent well completion system data sheet
Reclosable Hydraulic Well Barrier Valve (X-HBV™)

Superior’s Hydraulic Well Barrier Valve (X-HBV™) is utilized as a temporary barrier for service as a Type-CC V1 qualified product as per API-19V. The field-run and tested rigid frame is designed for harsh downhole environments. The debris tolerant interior hydraulic and mechanical mechanisms are configured for long-term, reliable service under severe wellbore conditions. In addition, the length between the ball and shifting profiles are customizable. The valve provides a unique hydraulic actuated trigger feature which allows a choice of cycles from 5, 8, 11, 14, 17, 20 +/- 1.

Superior’s X-HBV provides a one-time hydraulically trigger open feature despite multiple mechanical shifts to open or close prior to hydraulic activation. Once functioned hydraulically, the valve can be cycled open or closed numerous times by mechanical means. A multi-action, basket-style, soft-release collet shifting tool is utilized for valve operations during the well completion phase; to provide a positive mechanical shifting under severe fluid loss conditions. A hydraulic-actuated shifting tool can also be utilized to open or close the ball valve relayed downhole via coiled tubing. The slim-factor tool design is adequate for production tubing entry while maintaining engagement required for a reliable mechanical valve function.

The hydraulic actuator and the axial-supported cam driven mechanism are preloaded in a fluid-filled environment with floating pistons to adjust to wellbore hydrostatic conditions. The actuation piston is held in position with a pre-determined shear value.

A pressure-assisted inert seal enhances integrity in low pressure gas wells while maintaining positive assurance at higher differentials. The frame design incorporates applicable safety and temperature factors to qualify the assembly as a barrier valve.
## Features and Benefits

- **Ratings**
  - 10,000 psi burst and collapse on body
  - Up to 7,500 psi bi-directional burst and collapse across the ball

- **Debris tolerant**
  - Actuation mechanisms shielded from internal debris
  - A screen protected, oil filled hydraulic chamber guarantees a clean environment for moving parts
  - Smooth ID to prevent debris collection

- **Shifting tools**
  - Mechanical – Multi-action, soft-release, basket style collet
  - Hydraulic – Pressure actuated coiled tubing shifting tool

- **Qualification**
  - Bi-directional fluid loss control valve
  - Qualified as per API-19V as a Type-CC V1 barrier valve
  - Valve for well completions and abandonments

- **Actuation**
  - Mechanical – pre and post hydraulic actuation
  - Hydraulic – one time only; remote multi-cycle trigger for controlled opening

- **Full bore ID maximizes production and permits access to the sandface**
- **Flexible upper completion operations such as pressure tests above a closed ball**
- **Multiple mechanical open and close cycles prior to and after hydraulic open**
Reclosable Mechanical Well Barrier Valve (X-MBV)

Superior’s Reclosable Mechanical Barrier Valve (X-MBV) has been certified for service according to API-19V as a Type-CC V1 grade temporary well barrier.

The ridged frame is well-suited for harsh downhole environments. The debris tolerant mechanism has been configured for long-term reliable service in various well conditions. In addition, the distance between the ball and the shift open profile is customizable, per the operator’s well completion configuration.

The axial-support, cam-driven mechanism has successfully functioned closed under massive fluid loss situations and opened with above and below ball differentials. The exterior frame design incorporates safety and temperature factors to qualify the assembly as a temporary barrier. Pressure-assisted inert seals enhance integrity in low pressure gas wells while maintaining positive assurance at higher differentials.

A multi-action, soft-release, basket-style collet shifting tool is utilized for valve operations during the well construction phase: delivering a positive mechanical engagement while mechanically functioning under extreme fluid loss conditions. A hydraulic-actuated, shifting tool is utilized to open or close the ball valve in production setting. The slim-factor tool design is adequate for production accessory entry while maintaining a positive engagement during contingency operation.
Features and Benefits

• Ratings
  • 10,000 psi differential burst and collapse rated body
  • 5,000 psi differential burst and collapse rated ball
  • Certified as per API-19V Type-CC to V1
  • 8.190” max OD x 4.560” min ID
• Debris tolerant
  • Actuation mechanism shielded from internal debris
  • Customizable length enhances functionality
• Shifting tools
  • Mechanical - multi-action, soft-release basket style collet
  • Hydraulic - pressure actuated coiled tubing shifting tools
• Certified barrier valve
  • Zonal isolation valve
  • Barrier valve for well completion and abandonments
• Permit full bore ID from sandface to enhance production and unrestricted access
• Multiple mechanical open and close cycles
• Bi-directional fluid loss control valve
Reclosable Barrier Valves

**TECHNICAL DATA**

Pressure rating across ball up to 7,500 psi (51.71 MPa)
Pressure rating across housing up to 10,000 psi (68.9 MPa)

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<th>Thread Connection</th>
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<td>inch mm</td>
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</tbody>
</table>

Premium metallurgies available upon request.
SECTION 4
Sealbore Packers and Accessories
SEALBORE PACKERS AND ACCESSORIES

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Comp-Perm™ Permanent Sealbore Packers

The Superior Completion Services **Comp-Perm™ Permanent Sealbore Production Packers** are part of a highly versatile system of tools and accessories that can be set mechanically, hydraulically, or on wireline. The production packers are frequently used as sump packers or on stimulation jobs where extremely high pressures and/or temperatures are encountered.

Standardized threads, seal diameters, seal lengths and packer tops allow maximum interchangeability with other common sealbore equipment. Optional packer bottoms are included in the full line of packer accessory equipment.

**APPLICATIONS**
- Completion operations
- Sand control
- Production packer applications

**Features and Benefits**
- Wireline-, mechanical- or hydraulic-setting options
- Adjustable shear for setting
- Metal backup system expands to casing ID to prevent rubber extrusion
- Parts keyed for easy millout
- A variety of elastomer materials (AFLAS®, Viton®, nitrile) are available
Comp-Perm™ Permanent Sealbore Packers

**TECHNICAL DATA**

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<tr>
<th>Differential pressure rating</th>
<th>10,000 psi (68.9 MPa)</th>
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<tr>
<td>Temperature rating</td>
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### Comp-Perm™ Permanent Sealbore Packers

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<th>Maximum Tool OD</th>
<th>Minimum Bore Through Seals</th>
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<td>242.8</td>
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<td>235.6</td>
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</table>

* Packers tested to API 11D1 and rated V0 – V6. Please contact your Superior representative for further information on specific sizes.

**REFERENCES**

Completion tools seal systems data sheet
Packer plugs and accessories data sheet
CompSet™ Packers

CompSet™ HP-II (≤10,000 psi Differential)
CompSet™ XTR (12,500 psi Differential)
CompSet™ Ultra (15,000 psi Differential)
CompSet™ Elite (17,500 psi Differential)

The Superior Completion Services CompSet™ externally retrievable sealbore packers are designed for high-pressure (HP) and high-temperature completions. These packers provide positive isolation during maximum loads, differentials and temperature cycles for harsh completion. They also provide stimulation applications, including gravel and frac-packing, high-rate water packing, stimulations and horizontal completions. The CompSet™ packers can also be used as production sealbore packers and have been tested and manufactured in accordance with API 11D1 specifications.

APPLICATIONS
- Gravel/frac-packing
- Sand control
- Horizontal, deviated and vertical wells
- Zonal isolation; production isolation

Features and Benefits
- Single-sealing packing element eliminates extrusion and extends packer life downhole
- External retrieving sleeve facilitates easy packer retrieval with obstruction in sealbore
- Designed for simple external release and retrieval; optional internal release
- Large bore through packer and seals
- Single high-pressure sealing element
- Splined to facilitate milling removal if required
- Gauge ring on lower end of packer helps prevent premature setting when an obstruction or tight spot is encountered
- Hydraulic- or wireline-set
- Can be released with restricted ID
- Rotationally locked
CompSet™ Ultra Packer

The Superior Completion Services CompSet™ Ultra Retrievable Sealbore Packer is designed for ultra high temperature and pressure completions. The packer provides positive isolation during maximum loads, differentials and temperature cycles for harsh completion production environments.

APPLICATIONS

- Gravel/frac-packing
- Sand control
- Horizontal and vertical wells
- Zonal isolation; production isolation

Features and Benefits

- Single-sealing packing element eliminates extrusion and extends packer life downhole
- External retrieving sleeve facilitates packer retrieval with obstruction in sealbore
- Designed for simple external release and retrieval; optional internal release
- Large bore through packer and seals
- Single high-pressure sealing element
- Splined to facilitate milling removal if required
- Gauge ring on lower end of packer helps prevent premature setting when an obstruction or tight spot is encountered
- Hydraulic- or wireline-set
- Can be released with restricted ID
- Rotationally locked

TECHNICAL DATA

Available sizes 10 1/8 in., 9 7/8 in. and 7 3/4 in. (257.2 mm, 250.8 mm and 196.85 mm)

Differential pressure rating 15,000 psi (103.4 MPa)

Temperature rating 350°F (177°C)

REFERENCES

Completion tools seal systems data sheet
CompSet™ Elite Packer

The Superior Completion Services **CompSet™ Elite Retrievable Sealbore Packer** is a family of workstring conveyed, hydraulic-set, retrievable, sealbore production packers. These packers are designed specifically for high-pressure high-temperature (HPHT) environment and are qualified to the most stringent API11D1 validation grade V0-H.

**APPLICATIONS**

- Production packer
- Sand control, Stand-Alone
- Horizontal and vertical wells
- Zonal isolation; production isolation

**Features and Benefits**

- Rated up to 17,500 psi (1,207 bar) and 300°F (149°C)
- API 11D1 – V0H validation ensures gas-tight sealing in HPHT and severe downhole environments
- External retrievability with a contingency internal retrieval option
- Single sealing packing element with proprietary backup package for reliable performance
- Pressure boosted element design
- Proprietary slip system design for 360-degree engagement and force distribution, withstands high tensile and- compressive loads, and allows for easy retrieval
- Active zero-motion feature to prevent unnecessary packer movement under extreme stress or differential unloads
- Element above slip design protects slip system from debris
- Accessories qualified to API 19AC with full metal-to-metal sealing
- NACE compliant metallurgy
- API Q1 Quality Management Program and monogram capability

**TECHNICAL DATA**

Available sizes

10 1/8 in., 9 7/8 in. and 7 3/4 in. (257.2 mm, 250.8 mm and 196.85 mm)

Differential pressure rating

17,000 psi (1,207 bar)

Temperature rating

300°F (149°C)

**REFERENCES**

Completion tools seal systems data sheet
# CompSet™ Packers

## TECHNICAL DATA

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<th>CSHP Series</th>
<th>Extreme Series</th>
<th>Ultra Series</th>
<th>Elite Series</th>
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<td>7 ¾” &amp; 9 ¼” - 10¼”</td>
<td>7 ¾” &amp; 9 ¾” - 10¼”</td>
<td>7 ¾” &amp; 9 ¾” - 10¼”</td>
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<td><strong>API 11D1 Validation Grades</strong></td>
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**REFERENCES**
- Completion tools seal systems data sheet
- Packer plugs and accessories data sheet
## CompSet™ Packers

### TECHNICAL DATA

#### CompSet HP

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#### CompSet Extreme (XTR)

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<td>kg/m</td>
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</tr>
</tbody>
</table>

* Alternate bore configurations available upon request.

### REFERENCES

Completion tools seal systems data sheet
Packer plugs and accessories data sheet
Seal Systems

Superior Completion Services provides a variety of Seal Systems and alloy materials to accommodate most well conditions. It is important to know the well conditions and the work needed before choosing the proper seal system. Consideration should be given to temperatures, hostile elements, seal movements and maximum pressure differentials. These factors will determine the seal type, metal material and accessories to be utilized.

For all sealbore tubing accessories, standardization of threads, seal diameters and seal lengths have been carefully considered in the design to maximize interchangeability with competitive sealbore equipment. All steel components for the sealbore tubing accessories are manufactured to meet NACE MR0175 standards for H2S service. The accessories are also available in several types of material with the following examples:

- High-strength alloy steel for high-pressure applications
- 9CR-1MO alloy steel for H2S and CO2 applications
- High-nickel alloy steel for severe corrosion applications

Two basic seal types are currently available:

- Elastomer bonded to metal commonly known as molded seals available in:
  - Nitrile, Viton®, Fluorel®, EPDM, ECO
  - HSN materials Chevron-style, lip-type seals commonly known as V-rings available in:
    - Nitrile, Viton, Fluorel, Teflon®, AFLAS®, Ryton® and Kalrez® materials

Molded Seal System

This system is recommended for applications where it is likely that the seals will be disengaged from the packer sealbore with differential pressure pre-sent. Two seal rings are bonded to a metal sleeve with an internal O-ring to provide a positive seal. This system is available in various elastomers and is application dependent.

Standard Chevron Seal System

This system’s seal stack consists of chevron seal rings with steel spacers. This seal configuration is best suited for applications in which the seals will not disengage from the packer sealbore.

HSN seal stack: recommended for maximum temperatures of 350°F (177°C) in a standard service environment
Seal Systems

Seal Spacer Tube
In installations requiring floating seals and sealbore extensions, installation costs can be reduced by using spacer tubes between the seal units, reducing the number of seal units required.

VTR Premium Seal System
This system's seal stack consists of alternate Viton, Teflon and Ryton seal rings with middle and end metal spacers. It is recommended for maximum temperatures of 400°F (205°C) high pressure, and a limited H2S and/or CO2 environment. Not recommended for applications where amine-based inhibitors will be used.

ATR Premium Seal System
This system's seal stack consists of alternate AFLAS, Teflon and Ryton with metal end and middle spacers. Recommended for maximum temperatures of 400°F (205°C), amine inhibitors and H2S and/or CO2 environments.

KTR Premium Seal System
This system's special seal stack consists of Kalrez, Teflon and Ryton with metal end and middle spacers. Recommended for maximum temperatures of 500°F (260°C), amine inhibitors and a high H2S and/or CO2 environment.

Viton, Kalrez and Teflon are registered trademarks of DuPont Performance Elastomers LLC. Flourel is a registered trademark of 3M Co. AFLAS is a registered trademark of Asahi Glass Co., Ltd. Ryton is a registered trademark of Chevron Phillips Chemical Co. LLC.
Uni-Pac™ System

Superior Completion Services has developed a unique, state-of-the-art production seal for high-pressure, high-temperature (HP/HT) environments. This production sealing design uses the same technology incorporated in the HP packer one-piece sealing element. Uni-Pac™ Seals are designed to be used with locators, pop-lock assemblies, anchor assemblies, straddle assemblies and indexing mule shoes.

APPLICATIONS

• HP/HT environments

Features and Benefits

• Zero extrusion gap
• Reliable seal for unloads
• Limited thread connections
• No slip-on metal spacers
• One-piece mandrel
• Available with high-torque, metal-to-metal connections
• Premium Uni-Pac seals are offered in a variety of materials

TECHNICAL DATA

Available sizes 2.688 to 6.00 in. (68.3 to 152.4 mm)*
Differential pressure rating up to 15,000 psi (103.4 MPa)

REFERENCES

Completion tools tubing seal accessories data sheet
Mule shoes data sheet
Sealbore Packer Accessories

Re-entry Guide
The re-entry guide is the standard bottom for all Superior Completion Services packers unless ordered otherwise. The wireline re-entry guide is available with a choice of thread connections to adapt to sealbore extensions, millout extensions or tubing run below a packer.

Sealbore Extension Coupling
This concentric coupling is used to connect two sealbore extensions together to obtain more sealbore length. These couplings allow for a continuous, concentric sealbore connection between sealbore extensions.

Adapters
Tubing adapters used for running a tailpipe below a packer, sealbore extension or millout sub are available with a choice of tubing threads. Millout adapters are used to adapt the millout sub to the packer. These are not required for all sizes of sealbore packers.

Knockout Plug
With a knockout plug installed, the packer serves as a temporary bridge plug, allowing pressure work to be performed above the packer. The knockout plug is removed with the production tube as the seal assembly is landed and falls to the bottom of the well. These plugs feature a pressure-balanced equalization system to ensure easy and reliable operation.

Flapper Assembly
The flapper assembly contains a spring-loaded, flapper-type, backpressure valve that holds pressure from below only. The valve is opened with the production tube when the seal assembly is landed into the packer and automatically closes when the production tube is removed. A differential pressure below the packer acts across the seal area of the flapper, holding it closed. This force must be overcome with tubing weight to open the flapper.
Sealbore Packer Accessories

Sealbore Extension
This extension is generally used in installations where floating seals are required due to excessive tubing contraction. Sealbore extensions have the same sealing bore ID as the corresponding packer to allow a continuous sealbore for the lower-most seals of a long seal assembly. Sealbore extensions are available in a variety of lengths.

Millout Sub
The millout sub is used in installations where a larger ID is required to accommodate the latching mechanism of a washover tool. This allows the permanent packer to be retrieved with the tool after milling over the outside of the packer. Millout subs are commonly installed between the packer and sealbore extension in installations using floating seal units.
Sealbore Packer Accessories

The Superior Completion Services Sealbore Packer Accessories meet NACE MR0175 standards for H2S service. The accessories are also available in other materials such as:

- High-strength alloy steel for high-pressure applications
- CR-MO alloy steels for H2S and CO2 applications
- Incoloy® alloys for severe corrosion applications
Tubing Seal Accessories

Locator Seal Nipple
The Superior Completion Services locator seal nipple is run between the seal assembly and production tubing. The locator is designed to locate on the top of the sealbore to provide an indication of the seal assembly's location. The locator is designed to prevent downward tubing movement but allows the seals to move freely with tubing contraction.

Pop-Lock Locator
The pop-lock locator is run between the seal assembly and production tubing. The locator’s latch assembly is designed to engage a corresponding thread in the downhole completion assembly. At a predetermined overpull, the latch will release from the thread, providing a surface indication of positive latch engagement and release. The locator provides a positive depth confirmation by tagging a large surface at the top of the packer’s sealbore. Pop-lock locators are offered in a variety of threads, including premium threads.

Anchor Latch
The Superior Completion Services anchor latch is run between the seal assembly and the production string. A positive latch snaps into the corresponding thread on the completion assembly and anchors the tubing in place. The anchor latch may be released by applying a slight upstrain with RH rotation.

Tubing Seal Nipple
The tubing seal nipple allows the seal assembly to connect directly to the tubing without a locating shoulder or pop-lock locator assembly. The seals and tubing are then able to pass through the corresponding sealbore without locating.
Tubing Seal Accessories

**Seal Spacer Tube**
In installations requiring floating seals and sealbore extensions, installation costs can be reduced by using spacer tubes between the seal units, reducing the number of seal units required.

**O-Ring Seal Sub**
The Superior Completion Services O-ring sub provides a seal between a polished stinger (run on the end of wash pipe) and a corresponding outer assembly. Other applications for the sub include diverting fluid through screen assemblies or isolating lower zones from upper zones during treating operations.
Dual-Flow Head

The Superior Completion Services **Dual Flow Head** is run in conjunction with a production seal assembly, forming a positive seal in the top gravel pack packer and may also be used with Superior Completion’s sealbore packers to create a dual tubing completion. The long-string flow is routed through isolation tubing running through the upper zone screen assembly. The upper zone flows concentrically between the OD of the isolation string and the ID of the production seal assembly.

**APPLICATIONS**

- Dual tubing completions
- High-pressure completions
- Deep dual completions

**Features and Benefits**

- Allows high-pressure dual completions
- Easily retrieved; no dual-packer required

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Size</th>
<th>Tubing 1</th>
<th>Tubing 2</th>
<th>Lower Seal Assembly OD</th>
</tr>
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<tbody>
<tr>
<td>7 ¾ x 2 ½%</td>
<td>177.8 x 193.7 x 60.3</td>
<td>2 ½</td>
<td>60.3</td>
</tr>
<tr>
<td>9 ½ x 4 ¾ x 2 ½%</td>
<td>244.5 x 120.7 x 73.0</td>
<td>2 ½</td>
<td>75.0</td>
</tr>
<tr>
<td>9 ½ x 6 x 3 ½%</td>
<td>244.5 x 152.4 x 88.9</td>
<td>3 ½</td>
<td>88.9</td>
</tr>
</tbody>
</table>

**REFERENCES**

- Comp-Perm™ permanent sealbore packers data sheet
- CompSet™ packers data sheet
- CompSet™ Ultra packer data sheet
Mule Shoes

Half-Mule Shoe
The Superior Completion Services half-mule shoe is run below seal assemblies to allow easy entry into packer bores.

Indexing Mule Shoe
The Superior Completion Services indexing mule shoe with spring protection is designed to assist in guiding the end of a downhole assembly when entering a reduced ID, such as a packer bore or liner top. The rotational action incorporated in the mule shoe design eliminates the need to rotate the pipe from surface. The lower portion of the mule shoe rotates in multi-degree increments, manipulating the angled end of the mule shoe to easily enter the reduced ID. The sub is actuated by applying set-down weight to the end of the assembly, compressing the actuator spring. As the set-down weight is removed, the end of the assembly travels through a J-track, rotating a fixed distance each cycle.

Dual-Indexing Mule Shoe
The dual-indexing mule shoe includes two indexing mechanisms to provide redundant operation. This is especially useful in highly deviated wells or in applications where wellbore cleanliness is in question.
Mule Shoes

TECHNICAL DATA

<table>
<thead>
<tr>
<th></th>
<th>Size</th>
<th>Maximum OD</th>
<th>Minimum OD</th>
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<tr>
<td></td>
<td>inch</td>
<td>mm</td>
<td>inch</td>
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<tr>
<td>Half-Mule Shoe</td>
<td>2.287</td>
<td>58.1</td>
<td>2.63</td>
</tr>
<tr>
<td></td>
<td>3.250</td>
<td>82.6</td>
<td>3.19</td>
</tr>
<tr>
<td></td>
<td>4.000</td>
<td>101.6</td>
<td>3.87</td>
</tr>
<tr>
<td></td>
<td>4.750</td>
<td>120.7</td>
<td>4.69</td>
</tr>
<tr>
<td></td>
<td>6.000</td>
<td>152.4</td>
<td>5.94</td>
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<tr>
<td>Indexing Mule Shoe</td>
<td>2.687</td>
<td>68.3</td>
<td>2.63</td>
</tr>
<tr>
<td>with Spring Protection</td>
<td>3.250</td>
<td>82.6</td>
<td>3.19</td>
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<td></td>
<td>4.000</td>
<td>101.6</td>
<td>3.95</td>
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<tr>
<td></td>
<td>4.750</td>
<td>120.7</td>
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<td></td>
<td>6.000</td>
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<tr>
<td>Indexing Mule Shoe</td>
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<td>68.3</td>
<td>2.63</td>
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<tr>
<td>with Spring Protection</td>
<td>3.250</td>
<td>82.6</td>
<td>3.19</td>
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<td></td>
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<td></td>
<td>4.750</td>
<td>120.7</td>
<td>1.68</td>
</tr>
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</table>
Mechanical Shear Safety Joint

The Superior Completion Services Mechanical Shear Safety Joint provides a known break point in the downhole assembly. It has been designed to withstand differential pressures of 10,000 psi (68.9 MPa) for standard service applications. Upon request, 12,500- and 15,000-psi (86.2- and 103.4-MPa) differential pressure rated designs are available. Milled slots and lugs provide a rotational lock feature to aid in packer entry, fishing and milling operations. Premium threads and metallurgy are also available upon request.

APPLICATIONS

• Long horizontal sections
• General completion assemblies

Features and Benefits

• Rotationally locked assembly
• Shear-pinned value is adjustable to break at 70,000 to 230,000 lb (31,818 to 104,545 kg) tension
• 12-, 24- and 36-in. (304.8-, 609.6- and 914.4-mm) seal surface are available
• Optional overshot with internal molded seals used during contingency operations

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Mechanical Shear Safety Joint</th>
<th>Size</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
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<tbody>
<tr>
<td>Molded Safety Shear Sub</td>
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<td>2.93</td>
<td>1.94</td>
</tr>
<tr>
<td></td>
<td>2 ½</td>
<td>3.56</td>
<td>2.36</td>
</tr>
<tr>
<td></td>
<td>3 ½</td>
<td>4.38</td>
<td>3.00</td>
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<tr>
<td>Safety Shear Sub</td>
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<td>4.92</td>
<td>3.49</td>
</tr>
<tr>
<td></td>
<td>4 ½</td>
<td>5.19</td>
<td>3.89</td>
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<tr>
<td>Molded Safety Shear Sub</td>
<td>5</td>
<td>5.85</td>
<td>4.25</td>
</tr>
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<td></td>
<td>5 ½</td>
<td>6.13</td>
<td>4.74</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>7.69</td>
<td>6.04</td>
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</table>
Hydraulic Shear Safety Joint

The Superior Completion Services Hydraulic Shear Safety Joint is designed for the ComPlete™ single-trip systems to run above screen sections, blank sections, and directly above isolation packers. This shear sub contains a hydraulic-release mechanism, which is able to carry the full load of the gravel pack assembly into the wellbore. This prevents the load from being carried by the shear joint screws, allowing long, heavy assemblies to be run without fear of premature shearing.

The hydraulic-actuation feature is initiated by applying tubing to annulus differential pressure. Once actuated, the load is relieved from the hydraulic mechanism and transferred to the shear screws. If retrieval is initiated, this break point in the assembly enables retrieval of isolation packers separately from screens in the same zone. The shear joint contains polished OD sealing lengths ranging from 8 to 24 in. (203.2 to 609.6 mm). A bonded inverted seal overshot is available for re-entry if needed.

APPLICATIONS
- Long completion intervals
- Multizone single-trip completions

Features and Benefits
- Allows full weight carrying capability prior to actuation
- Allows standard shear values for retrieval while maintaining high weight carrying ability
- Rotationally locked assembly
- Production molded seal assembly available for contingency operations
# Hydraulic Shear Safety Joint

## TECHNICAL DATA

<table>
<thead>
<tr>
<th>Hydraulic Shear Safety Joint</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
<th>Collapse/Burst Rating</th>
<th>Seal Travel Length</th>
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</thead>
<tbody>
<tr>
<td>Short Hydraulic Shear Joint*</td>
<td>8.05 204.5</td>
<td>3.75 95.3</td>
<td>10,000 69.0</td>
<td>24 609.6</td>
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<tr>
<td></td>
<td>8.12 206.1</td>
<td>5.13 130.2</td>
<td>8,500 58.6</td>
<td>8 203.2</td>
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<tr>
<td>Hydraulic</td>
<td>7.00 177.8</td>
<td>4.26 108.1</td>
<td>12,500 86.2</td>
<td>24 609.6</td>
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<tr>
<td>Shear Joint</td>
<td>7.53 191.3</td>
<td>5.46 138.8</td>
<td>8,500 58.6</td>
<td>24 609.6</td>
</tr>
</tbody>
</table>

*Recommended to be run above ComPlete™ MST system isolation packers.

### REFERENCES

ComPlete™ system data sheets (HST, MST, RST)
Expansion Shear Joints

The Superior Completion Services Expansion Shear Joints provide limited up or down movement between the upper and lower connections. The expansion joint is rotationally locked and sealed to withstand high differential pressures. The assembly is shear-pinned together and movement will not occur until the pre-set shear release value is exceeded.

APPLICATIONS

- Long assemblies with projected tubing movement
- Subsea wells
- Reservoirs with concerns over compaction

Features and Benefits

- Allows both upward and downward travel
- Variable initial shear value settings
- Provides a smooth mandrel for resealing if required
- Bonded seal overshot available for contingency operations

Technical Data

<table>
<thead>
<tr>
<th>Size</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
<th>Maximum Stroke</th>
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<td>inch</td>
<td>mm</td>
<td>inch</td>
<td>mm</td>
</tr>
<tr>
<td>2 ⅙</td>
<td>60.3</td>
<td>3.03</td>
<td>77.0</td>
</tr>
<tr>
<td>3 ⅛</td>
<td>88.9</td>
<td>4.11</td>
<td>104.4</td>
</tr>
<tr>
<td>4 ⅜</td>
<td>114.3</td>
<td>5.53</td>
<td>140.5</td>
</tr>
<tr>
<td>5 ⅜</td>
<td>139.7</td>
<td>7.38</td>
<td>187.5</td>
</tr>
</tbody>
</table>
Packer Plugs and Accessories

**VT Equalizing Packer Plug**
The VT Equalizing Packer Plug is used to temporarily seal the ID of Superior Completion Services’ sealbore packer. The plug latches into the top threads of the packer to form a positive seal in both directions. The packer plug contains an equalizing valve to allow the plug to be set and returned above a flapper valve or other closed system.

**Dual-Equalizing Packer Plug**
The Dual-Equalizing Packer Plug has the same features as Superior Completion Services’ VT equalizing packer plug. It includes an optional grapple release control bar that may be run with a standard short catch overshot for retrieval.

**Packer Plug Running Tool**
The Packer Plug Running Tool consists of an overshot that is shear-pinned to the packer plug control bar prior to being run into the wellbore. The running tool also engages an equalizing valve located above the top of the packer plug. The equalizing valve is run in the open position, which allows the plug to be landed in a closed system. Once landed, the running tool is sheared free, closing the equalizing valve and isolating the area below the packer plug.

**Packer Plug Retrieving Tool**
The Packer Plug Retrieving Tool is made up of a washover head with an internal retrieving sleeve. The retrieving sleeve engages the lug mounted on the packer plug control bar to provide positive engagement for reliable retrieving. The overshot has milling teeth to break up hard debris when washing over the plug control bar.

**Debris-Free Retrieving Tool**
The Superior Completion Services Debris-Free Packer Plug Retrieving Tool is uniquely designed to allow complete washover of the packer plug prior to engaging the retrieving tool. The retrieving tool is shrouded by a shearscrewed and spring-loaded wash pipe assembly. Once the packer plug is circulated clean, set-down weight shears the retrieving tool from the outer shroud, allowing it to engage the plug. The spring-loaded shroud stays engaged with the plug top, trapping debris that may have been washed into the tubing.
Straddle Fixture

The Superior Completion Services **Straddle Fixture** isolates the uppermost molded seal frac sleeve of an intelligent (selective) or dual sand control completion. The straddle running tool includes a premium box connection; the shear pins rotationally lock the running tool. The Straddle Fixture is forced in position and anchored with an anchor latch ring and released with upward pull. The fixture is designed with an internal retrieving thread for easy engagement. Straight upward pull will shear the support under the latch ring, releasing the fixture. The **Straddle Fixture** will also release with a slight upward pull and RH rotation.

**APPLICATIONS**

- Production isolation

**Features and Benefits**

- Positive locator
- Rotationally locked assembly
- Shear-type/straight-pull release
- Redundant rotational release
- Pressure balanced

**TECHNICAL DATA**

| Available seal unit sizes  | 4 to 6 in. (110.6 to 152.4 mm) |
| Available materials        | 4140 and 13 chrome              |

**REFERENCES**

- CompSet™ Packers data sheet
- CompSet™ Ultra Packers data sheet
Spud-Type Packer Retrieving Tool

The Spud-Type Packer Retrieving Tool is utilized to reclaim Superior Completion Services’ CompSet™ series of externally retrievable packers. The tool utilizes a standard retrieving overshot in conjunction with an inner jar-down mandrel to assist in releasing the CompSet™ HP packers. The inner mandrel is free to move up and down through the overshot, providing a mechanical jarring effect.

APPLICATIONS
• Packer retrieval

Features and Benefits

• Sliding inner mandrel assists in mechanical jarring action
• Standard retrieving overshot
• Allows upward and downward jarring action on the packer
• LH thread for contingency release

REFERENCES
CompSet™ Packers data sheet
CompSet™ Ultra Packers data sheet
SECTION 5
Production Packers
PRODUCTION PACKERS

CompPro™ Elite Packer 76
CompPro™ TIP Packer 77
CompPro™ Dual Packer 79
ComPlete™ MST System Isolation Packer 81
CompPro™ Elite Packer

The Superior Completion Services CompPro™ Elite Retrievable Production Packer is a family of workstring conveyed, hydraulic-set, retrievable, sealbore production packers. These packers are designed specifically for high-pressure high-temperature (HPHT) environment and are qualified to the most stringent API11D1 validation grade V0-H.

APPLICATIONS

- Production packer
- Pass-thru packer for intelligent completion
- Horizontal and vertical wells
- Zonal isolation; production isolation

Features and Benefits

- Rated up to 17,500 psi (1207 bar) and 300°F (149°C)
- API 11D1 – V0H validation ensures gas-tight sealing in HPHT and severe downhole environment
- Primary cut-to-release with a secondary external retrieval option
- Consists of a dedicated primary and secondary cutting zones for contingency
- Single sealing packing element with proprietary backup for reliable performance under challenging conditions
- Proprietary slip design for 360-degree engagement and force distribution, withstand high tensile - compressive loads, and easy retrieval
- Active zero-motion feature to prevent unnecessary packer movement under extreme stress or differential unloads
- QTY 3x ½ in (12.7 mm), 4x ¼ in (6.35 mm) of maximum pass-throughs
- Seamless conversion to non-Pass-thru packer to meet the needs of various applications
- API 11D1 validation and SCS quality management system API Q1 certification allows for optional API monogram

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tr>
<td></td>
<td>(257.2 mm, 250.8 mm and 196.85 mm)</td>
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<tr>
<td>Differential pressure rating</td>
<td>17,500 psi (1,207 bar)</td>
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<tr>
<td>Temperature rating</td>
<td>300°F (149°C)</td>
</tr>
</tbody>
</table>

REFERENCES

Completion tools seal systems data sheet
CompPro™ TIP Packer

The Superior Completion Services **CompPro™ Testable Isolation Production (TIP) Packer** is a versatile, hydraulically set, high-performance, tubing retrievable packer that includes several design features to enhance reliability. The packer is designed with dual high-pressure sealing elements to ensure a positive seal. The dual elements enable high-pressure integrity tests without exposing liner tops or casing strings to test pressures. This configuration also provides a means of pressure testing the packer when positioned between producing intervals.

The packer is also designed with no mandrel movement during setting, allowing multiple packers to be set simultaneously. The TIP packer is certified to handle 10,000 psi (68.9 MPa) differential pressures in both oil and gas environments. The packer is retrievable, and several release options are available.

**APPLICATIONS**

- High-pressure, high-temperature wells
- Multizone completions

### Features and Benefits

- Multiple release options available, including straight pull and cut-to-release
- One-piece mandrel prevents movement during setting
- Dual high-pressure and self-energizing sealing elements enhance packer seal and differential rating
- Unique pressure-sensitive interlock feature prevents premature setting
- Bidirectional slips
- Rotationally locks in running, set and release positions
- Pressure-assisted seals: above, internal and below
- Gauge ring positioned at lower end of packer
- Maximum slip area for high loads and pressure differentials
**CompPro™ TIP Packer**

**TECHNICAL DATA**

- Differential pressure rating: 10,000 psi (68.9 MPa)
- Temperature rating: 350°F (177°C)

<table>
<thead>
<tr>
<th>Casing Size</th>
<th>Tool Size</th>
<th>Casing Weight Range</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
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<tbody>
<tr>
<td>7 inch</td>
<td>177.8 mm</td>
<td>7.00 x 3.00 177.8 x 76.2</td>
<td>20.0-26.0 29.7-38.6</td>
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<td>8.31 211.0</td>
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<td>9.875 x 3.00 250.8 x 76.2</td>
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<td>8.42 213.9</td>
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<tr>
<td>10 ¾</td>
<td>257.1 mm</td>
<td>10.125 x 3.00 257.1 x 76.2</td>
<td>79.20 117.8</td>
<td>8.42 213.9</td>
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</tbody>
</table>
CompPro™ Dual Packer

The Superior Completion Services CompPro™ Dual Packer is a hydraulic-set, dual string production packer. The packer is constructed on a short rigid frame with the sealing elastomers and a setting chamber positioned between opposing slips. Both production tubing strings are installed as the packer is deployed. Tubing hangers are normally landed and tested prior to packer setting. The packer is V-3 certified for service up to 5,500 psi according to API 11D1 specifications. An adjustable mechanical release requires tension on the long string to shear release the long string mandrel from the lower slip cone.

APPLICATIONS
• Deviated and horizontal wells
• High-volume instrumented applications
• Well monitoring, gas venting, chemical injection and hydraulic-line access
• Multizone isolation

Features and Benefits

• Stackable for multizone applications
• Three element sealing system
• Secondary Setting: Applied Hydraulic Pressure Long String Internal
• Setting Chamber below packer elements; extends production sealing life
• No mandrel movement during setting; ideal for setting after wellhead installation
• Pressure assisted internally and on the above annulus during production
• Release: Adjustable predetermined Long String Over-Pull with Sequential Upper Slip disengagement (Optional: Scoop Head with J-Latch and various types of seals)
# CompPro™ Dual Packer

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>CASING SIZE</th>
<th>ID</th>
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<th>Short String</th>
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ComPlete™ MST System Isolation Packer

The Superior Completion Services ComPlete™ MST System Isolation Packer is an integral part of Superior Completion’s multizone single trip (MST) system, providing zonal isolation between reservoirs. This hydraulically set packer is frac-rated and provides two elements with a testable feature to confirm the packer is fully set. If required, the packer can be retrieved with straight pull. The FlowSafe™ WR Safety Valve can be installed as a primary safety valve landed in a hydraulic nipple. It can also be used to remediate a failed Tubing-Retrievable (TR) Safety Valve.

The ComPlete MST System Isolation Packer is adapted from other field-proven production and service packer designs. The packer allows multiple reservoirs to be isolated and treated in a single trip.

APPLICATIONS

- Multizone reservoirs
- Zonal isolation
- Deepwater
- Sand control

Features and Benefits

- Hydraulically set
- Dual elements with a testable feature
- Hold down buttons for frac rating
- Straight-pull retrieval
- Allows isolation and treatment of multiple zones in a single trip
- Additional time savings as multiple packers can be set and tested at once
# ComPlete™ MST System Isolation Packer

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## REFERENCES

ComPlete™ MST system data sheet
SECTION 6
Unconventional Packers
UNCONVENTIONAL PACKERS

OmniFrac® Open Hole Packer
OmniFrac® Open Hole Packer

Superior Completion Services developed the OmniFrac® Open Hole (OH) Packer to isolate intervals in uncased sections of horizontal, deviated and vertical wells. The compact design includes a unique mechanical interlock feature to reduce the risks of setting prior to reaching the objective setting depth. The packer is set with internal applied pressure. The interlock mechanism is deactivated upon reaching the predetermined shear pressure. Element energy is generated by directional-setting pistons and stored as the lock ring ratchets during the setting process. Applied or wellbore pressure assists the annular seal.

APPLICATIONS

- Horizontal, deviated and vertical wells, where multi-stage frac operations are required.

Features and Benefits

- Compact design for horizontal deployment
- 10,000 psi V-5 certified at 300°F
- Hydraulic interlock reduces deployment risks by locking the outer moving parts
- Directional setting piston to ensure setting energy is generated at lower setting pressures
- Wire mesh supported elastomer provides additional support
- Flowing pressure enhances annular seal
- No mandrel movement
## OmniFrac® Open Hole Packer

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SECTION 7
Intelligent Systems
INTELLIGENT SYSTEMS

Hydraulic Actuated Well Completion (HAWC™) System 85
CompPro™ Elite Packer 87
Hydraulic-Actuated Well Completion (HAWC™) System

HAWC™ is Superior’s intelligent well completion package, consisting of a pass-through production packer and independently operated hydraulic control sleeves. The system has numerous applications in deepwater, multizone, high-angle completions, and production field management. It provides flexibility to selectively control flow from various zones in a single well and has the capability to remotely shift between producing zones, thereby maximizing overall production. With real-time measurement of downhole temperature and pressure, operators can isolate and adjust the internal flow. The HAWC™ system is known for its reliability, and provides consistent long-term performance in challenging downhole environments.

**APPLICATIONS**
- Deepwater wells
- Multizone completions
- Remote production/injection access
- High-angle completions
- Production field management

**Features and Benefits**
- Reliably and economically controls multiple completions in a single well and remotely shifts production between zones to optimize field production
- Provides an additional barrier for well control operations when demobilizing the rig
- The HAWC well completion package includes:
  - HAWC system valves that allow remote flow control of multiple zones
  - High-pressure isolation production packer with multiple pass-throughs
  - The integration of surveillance equipment that provides real-time, reliable, multizone measures of downhole temperature and pressure
Hydraulic-Actuated Well Completion (HAWC™) System

SYSTEM COMPONENTS
1. Hydraulic Set Instring Pass Through Packer (cut or shear release)
2. Break assembly
3. Upper HAWC System Valve (w/ “R” Profile Sub)
4. Lower HAWC System Valve (w/ “R” Profile Sub)
5. Pressure containing shroud assembly

TECHNICAL DATA
- Differential Pressure Rating: Up to 15,000 psi (103.42 MPa)
- VO Rated w/ 10% Safety Factor and Temperature De-Rated
- Maximum Temperature: 350°F (177°C)

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<td>71.45</td>
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REFERENCES
HydroSeal HP-PT packer data sheet
HAWC system accessories data sheet
HAWC system valve data sheet
TIP-PT packer data sheet
Turner, D. 2006. Smart Well, Deepwater Solutions Petroleum Africa 4 (1)
CompPro™ Elite Packer

The Superior Completion Services CompPro™ Elite Retrievable Production Packer is a family of workstring conveyed, hydraulic-set, retrievable, sealbore production packers. These packers are designed specifically for high-pressure high-temperature (HPHT) environment and are qualified to the most stringent API11D1 validation grade V0-H.

APPLICATIONS

• Production packer
• Pass-thru packer for intelligent completion
• Horizontal and vertical wells
• Zonal isolation; production isolation

Features and Benefits

- Rated up to 17,500 psi (1207 bar) and 300°F (149°C)
- API 11D1 – V0H validation ensures gas-tight sealing in HPHT and severe downhole environment
- Primary cut-to-release with a secondary external retrieval option
- Consists of a dedicated primary and secondary cutting zones for contingency
- Single sealing packing element with proprietary backup for reliable performance under challenging conditions
- Proprietary slip design for 360-degree engagement and force distribution, withstand high tensile - compressive loads, and easy retrieval
- Active zero-motion feature to prevent unnecessary packer movement under extreme stress or differential unloads
- QTY 3x ⅜ in (12.7 mm), 4x ¼ in (6.35 mm) of maximum pass-throughs
- Seamless conversion to non-Pass-thru packer to meet the needs of various applications
- API 11D1 validation and SCS quality management system API Q1 certification allows for optional API monogram

TECHNICAL DATA

| Casing sizes  | 10 1/8 in., 9 7/8 in. and 7 3/4 in. (non PT). (257.2 mm, 250.8 mm and 196.85 mm) |
| Differential pressure rating | 17,500 psi (1,207 bar) |
| Temperature rating | 300°F (149°C) |

REFERENCES

Completion tools seal systems data sheet
SECTION 8
Subsurface Safety
SUBSURFACE SAFETY

FlowSafe™ Tubing-Retrievable Safety Valve
FlowSafe™ Wireline-Retrievable Safety Valve
FlowSafe™ Safety Valve Lock Mandrels
Superior Landing Nipples

88
90
92
94
FlowSafe™ Tubing-Retrievable Safety Valve

The Superior Completion Services FlowSafe™ Tubing-Retrievable Safety Valve (TRSV) is a flapper-type, equalizing or non-equalizing, surface-controlled subsurface safety valve (SCSSV) installed in the production string. The valve is designed to provide subsurface isolation to minimize loss of production and protect human life. It also reduces the potential for environmental discharge or damage to production equipment resulting from an uncontrolled surface or subsurface event.

The FlowSafe™ SCSSV is hydraulically controlled from the surface through a control line connected to the well control/emergency shutdown system. The FlowSafe™ TR Safety Valve is designed to facilitate easy installation of secondary FlowSafe™ Wireline-Retrievable (WR) Insert Safety Valve to provide continuous fail-safe operation.

APPLICATIONS
• Production and cement through applications
• Any area in which the integrity of the wellhead can be compromised

Features and Benefits

- Hydraulically controlled
- Single rod piston design
- Certified per API 14A specifications
- Maximized flow-through ID design
- Self-equalized through flapper option
- Non-elastomeric seals
- Metal-to-metal body joints
- Secondary lockout/communication
- Inverted dual ferrule control line connection
- Optimized design helps eliminate sand fouling
- Compact design and minimal number of parts increases reliability
- Minimized number of potential leak paths
- Premium metallurgies available for varied environments
FlowSafe™ Tubing-Retrievable Safety Valve

**TECHNICAL DATA**

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</tr>
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</tr>
<tr>
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<tr>
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- The data provided above is not inclusive of all pressure ratings and ODs available in the tubing sizes listed. For additional information, contact your Superior Completion Services representative.

- The tensile ratings listed are specific to the metallurgy for the valves listed and are exclusive of end connections. Tensile calculations are performed at ambient temperatures. Additional information is available upon request.

**REFERENCES**

The FlowSafe™ SCSSV brochure
FlowSafe™ WR Safety Valve data sheet
FlowSafe™ Wireline-Retrievable Safety Valve

The Superior Completion Services FlowSafe™ Wireline-Retrievable (WR) Safety Valve is a flapper-type, equalizing or non-equalizing, surface-controlled subsurface safety valve (SCSSV). The valve is designed to provide subsurface isolation to minimize loss of production and protect human life. It also reduces the potential for environmental discharge or damage to production equipment resulting from an uncontrolled surface or subsurface event.

The FlowSafe™ WR Safety Valve can be installed as a primary safety valve landed in a hydraulic nipple. It can also be used to remediate a failed Tubing-Retrievable as an Insert Wireline Safety Valve.

APPLICATIONS

- Offshore environments and onshore wells located in environmentally sensitive areas
- Any area in which the integrity of the wellhead can be compromised

Features and Benefits

- Hydraulically controlled
- Certified per API 14A specifications
- Maximized flow-through ID design
- Self-equalized through flapper option
- Optimized design helps eliminate sand fouling
- Compact design and minimal number of parts increases reliability
- Replacement for an existing TR safety valve
- Facilitates flow assurance well design criteria
- Minimized number of potential leak paths
- Premium metallurgies available for varied environments
## FlowSafe™ Wireline-Retrievable Safety Valve

### TECHNICAL DATA

#### FlowSafe™ Wireline-Retrievable Safety Valve

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The data provided above is not inclusive of all pressure ratings and ODs available in the tubing sizes listed. For additional information, contact your Superior Completion Services representative.

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**REFERENCES**

- FlowSafe™ TR safety valve data sheet
- FlowSafe™ SCSSV brochure
FlowSafe™ Safety Valve Lock Mandrels

The Superior Completion Services FlowSafe™ Safety Valve Lock mandrels are designed specifically for wireline safety valve applications. These feature industry standard profiles and offer 10K pressure ratings from below with an ID that matches the WLSV. These are manufactured under API Q1 and built to API 14L standards.

APPLICATIONS

• Insert wireline safety valve
• Wireline safety valve with hydraulic nipple
• Standard lock applications where a reduced ID is acceptable

Features and Benefits

• API 14L Certified
• Rated to full working pressure for the safety valve
• Validation grade up to V1
• Metallurgy selected for application
# FlowSafe™ Safety Valve Lock Mandrels

## TECHNICAL DATA

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</tbody>
</table>

**REFERENCES**

FlowSafe™ TR safety valve data sheet
FlowSafe™ SCSSV brochure
Superior Landing Nipples

Superior Completion Services offers a complete line of industry standard Landing Nipples. The nipples are available in a standard commodity line manufactured under API Q1 quality standards and a premium line of certified nipples manufactured under API 14L standards. These nipples are compatible with industry standard locks made for the selected profile and other standard flow control accessories. Nipples are available in standard 4130-45 series alloys, 9 or 13 chrome, Inconel and material to match service environment.

APPLICATIONS

- Land blanking plugs
- Land gauge hangers
- Land velocity valves
- Land chokes
- Land equalizing check valves

Features and Benefits

- Available in commodity and certified types
- Full line of industry standard profiles and sealbores
- Available with selective and No-Go varieties
- Designed for standard and heavy wall tubing sizes
- Available in standard and premium thread varieties
- Compatible with standard slickline flow control accessory tools
# Superior Landing Nipples

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*Note - this is not a complete listing of availability.*
SECTION 9
Well Screens & ICD Technologies
## WELL SCREENS AND ICD TECHNOLOGIES

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<tr>
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EconoWeld™

The Superior Completion Services EconoWeld™ screens, a slip-on wire wrap jacket welded directly to the base pipe, are tough, long-lasting screens designed for gravel pack and standalone screen installations inside perforated casing and limited openhole environments. Superior Completion Services combines innovative wire-wrap technology and advanced manufacturing processes to create EconoWeld™ screens. This product fits the need when an economical solution is required for your specific application.

APPLICATIONS

• Cased hole applications and short barefoot completion environments
• Particularly well suited for fracturing, high-rate gravel pack and standalone operations

<table>
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<td>• Higher number of ribs provides greater strength and tolerance for the life of the screen</td>
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<td>• Improved design reduces washouts caused by necking of wrap wire</td>
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<td>• Heavy-duty construction enables the screen jacket to maintain gauge tolerances</td>
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<td>• Superior Completions Services is capable of shaping custom wire configurations with our own in-house wire-shaping mill</td>
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<td>• Wire jacket welded directly to the base pipe offers savings</td>
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### EconoWeld™

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Metallurgy: Screens available in 316L or nickel alloy 825; base pipe available in a multitude of materials upon request.

Wire Combo: Standard screen uses 0.090”x0.075” “keystone” shaped wrap wire and 0.090”x0.140” “house” shaped rib wire.

HD screen uses 0.060”x0.100” “keystone” shaped wrap wire and 0.090”x0.140” “house” shaped rib wire.

EconoWeld™ screens features Keystone shaped wrap wire for plugging resistance.

### REFERENCES

Wire-wrapped and premium well screens brochure
EconoWeld™ TOP

The Superior Completion Services EconoWeld™ TOP is a wire-wrap jacket directly wrapped to the base pipe, providing a shrink-fit coupled jacket. The jacket is welded directly to the base pipe and delivers a robust long-lasting screen designed for extended-reach and long horizontal laterals, as gravel-packed and standalone screen installations inside of cased and perforated, or open hole environments. EconoWeld™ TOP has its gauge accuracy verified via an Automated Gauge Measuring System that validates the gap between wrap wires, meeting client specifications.

APPLICATIONS

- Long extended-reach and horizontal wells
- Standalone screen with Inflow Control Device, ICD
- Gravel and frac packed cased and perforated environments

Features and Benefits

- Innovative wire shape provides maximum erosion resistance and strength compared with standard configurations
- Higher number of ribs provides greater strength and tolerance for the life of the screen
- Improved design reduces washouts caused by necking of wrap wire
- Heavy-duty construction enables the screen jacket to maintain gauge tolerances
- Superior Completions Services is capable of shaping custom wire configurations with our own in-house wire-shaping mill
- Wire jacket welded directly to the base pipe offers savings
- Conventional and heavy-duty (HD) wire options are available


## EconoWeld™ TOP

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<tr>
<th>Base Pipe OD</th>
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hD screen uses 0.060”x0.100” “keystone” shaped wrap wire and 0.090”x0.140” “house” shaped rib wire.

EconoWeld™ screens features Keystone shaped wrap wire for plugging resistance.

### REFERENCES

Wire-wrapped and premium well screens brochure
**ProWeld™**

The Superior Completion Services ProWeld™ Screens, a slip-on wire wrap jacket attached to the base pipe, are tough, long-lasting screens designed for gravel pack and standalone screen installations inside perforated casing and limited openhole environments. Superior Completion Services combines innovative wire-wrap technology and advanced manufacturing processes to create ProWeld™ Screens. The result is a product that outperforms conventional wire-wrap screens with superior strength and an extended service life. Gauge accuracy is validated through the use of photometric automated gauge measuring system on every jacket manufactured.

**APPLICATIONS**

- Cased and limited openhole environments
- Particularly well-suited for fracturing, high-rate gravel pack and standalone operations

**Features and Benefits**

- Innovative wire shape provides maximum erosion resistance and strength compared with standard configurations
- Higher number of ribs provides greater strength and tolerance for the life of the screen
- Improved design eliminates necking of the wrap wire as it is being welded to the rib
- Heavy-duty construction enables the screen jacket to maintain gauge tolerance
- Superior Completion Services is capable of shaping custom wire configurations with our own in-house wire-shaping mill
- Conventional and heavy-duty (HD) wire options are available to meet your needs
**ProWeld™**

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<th>Base Pipe OD</th>
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HD screen uses 0.060"x0.100" "keystone" shaped wrap wire and 0.090"x0.140" "house" shaped rib wire.
ProWeld™ TOP screens feature Keystone shaped wrap wire for plugging resistance.

**REFERENCES**

Wire-wrapped and premium well screens brochure
ProWeld™ Precision TOP

The Superior Completion Services ProWeld™ Precision TOP is a wire jacket directly wrapped to the base pipe providing a shrink fit coupled jacket. Delivering a robust, long-lasting screen designed for extended reach and long horizontal laterals as gravel pack and standalone screen installations inside perforated casing and openhole environments. Superior Completion combines innovative wire-wrap technology and advanced manufacturing processes to create ProWeld™ Precision TOP Screens. The result is a product that outperforms conventional wire-wrap screens with superior strength and an extended service life. Gauge accuracy is validated through the use of an optical photometric automated gauge measuring system.

APPLICATIONS

• Long extended-reach and horizontal wells
• Standalone screen with Inflow Control Device, ICD
• Cased and openhole environments
• Particularly well-suited for fracturing, high-rate gravel pack and standalone operations
• Delivering selectivity by adapting a sliding sleeve to receive a direct wrapped wire jacket such as ProWeld™ Precision TOP for a robust product

Features and Benefits

• Innovative wire shape provides maximum erosion resistance and strength compared with standard configurations
• Higher number of ribs provides greater strength and tolerance for the life of the screen
• Improved design reduces washouts caused by necking of wrap wire
• Heavy-duty construction enables the screen jacket to maintain gauge tolerance
• Superior Completion Services is capable of shaping custom wire configurations with our own in-house wire-shaping mill
• Conventional and heavy-duty (HD) wire options are standard
### ProWeld™ Precision TOP

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ProWeld TOP screens feature Keystone shaped wrap wire for plugging resistance.

**REFERENCES**

Wire-wrapped and premium well screens brochure
**SlimFlo™ Pre-Packed**

The Superior Completion Services **SlimFlo™ Pre-Packed Screens** are designed with large spacer ribs on the outer screen for better concentricity and higher flow capacity. Used in conjunction with gravel packs, these robust screens provide an additional level of protection against erosion during sand placement and secondary protection against voids in the gravel pack.

**APPLICATIONS**
- Sand control
- High-rate water, gravel and frac-pack operations
- Openhole and horizontal completions
- When the potential for an incomplete pack is possible due to high leak-off zone, etc.

**Features and Benefits**
- Designed to have an annular pre-pack of 0.200 in. (5.08 mm) or greater
- Uses keystone- or house-design wrapped wire
- Pre-packing process helps ensure void-free, tight, uniform sand packs
- Intermittent spacer ribs maintain concentricity and ensure a uniform pack annulus
- Protects against erosion during sand placement
- Provides barrier to sand production through voids in the gravel pack
- Greater number of ribs increases tensile strength and provides a rounder, smoother jacket surface
- Available in standard and heavy-duty (HD) options
**SlimFlo™ Pre-Packed**

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Metallurgy: Screens available in 316L or nickel alloy 825; base pipe available in a multitude of materials upon request.

Wrap Combo:
- **Standard Screen**: The outer jacket uses 0.090"x0.075" "keystone" shaped wrap wire on 0.060"x0.100" "house" shaped rib wire. The inner jacket utilizes 0.090"x0.075" "keystone" shaped wrap wire on 0.090"x0.075" "keystone" shaped rib wire or a 0.075" "round" wire
- **HD Screen**: The outer jacket comprises of a 0.090"x0.075" "keystone" shaped wrap wire on 0.090"x0.140" "house" shaped rib wire. The inner jacket utilizes 0.090"x0.075" "keystone" shaped wrap wire on 0.090"x0.075" "keystone" shaped rib wire or a 0.075" "round" wire

**REFERENCES**

Wire-wrapped and premium well screens brochure
**EconoFlo™**

EconoFlo™ is an economical woven or stacked metal mesh screen solution that delivers premium performance for use in brown fields, heavy oil, and wherever steam cycling or injection is required. When the economics of an application do not merit the premium cost of a preferred metal mesh screen with larger inflow area, EconoFlo™ is the answer.

EconoFlo™ consists of a single layer of woven mesh material or a stacked layer of square weaves. It can be equipped with a drainage layer for use in applications requiring Inflow Control Devices (ICD) for balanced inflow control or sliding sleeves for on/off control. EconoFlo™ offers flow-through areas ranging from 40% to 60% depending on the designed micron rating of the filter layer.

EconoFlo™ offers a premium solution as a qualified and field-proven product when thermal cycling is required in cyclic steam stimulation, steam injectors or steam assisted gravity drain applications. Many customers default to the use of slotted liners and wire-wrap jacket screens on the basis of cost alone. However, slotted liners have limited inflow areas, from 3% to 5%, and wire-wrap jackets only offer inflow areas that range from 6% to 12% depending on the slot opening size. The inherent challenges of these types of solutions are their tendency to plug or produce sand over time and to not withstand the multiple thermal cycling effects during steaming operations.

EconoFlo™ has much higher inflow areas: up to ten times greater than traditionally used slotted liners and wire-wrap jackets. It continues to function long after plugging would be encountered with other options and its free-floating jacket enables use in cyclic temperature environments. EconoFlo™ can also be used as a standalone solution in lieu of the more expensive method of gravel packing. EconoFlo™ can extend the time between production and re-drilling due to plugged screens by months or years, if not until the end of the wells’ production life cycle.

**APPLICATIONS**

- Low cost environments (brown fields & heavy oil)
- Thermal cycling
- Standalone screen
- Run with Inflow Control Devices (ICD)
- Install with sliding sleeves
**EconoFlo™**

### Features and Benefits

- Metal mesh design offers up to ten times greater inflow area than other options
- Low cost — competitive with slotted liners and wire-wrap jackets
- Minimized manufacturing cost delivers a low-cost solution with premium performance
- Large 316Lss wire diameters used in weaved or stacked mesh design permits the use of acid treatments without loss of sand control
- Swaging filter assembly to base pipe eliminates any need for welding
- Free-floating jacket enables movement of the screen assembly independent of the base pipe in thermal applications
- Inner drainage layer allows compatibility with inflow control devices and sliding sleeves
- Incorporation of Inflow Control Devices (ICD) and sliding sleeves enables balanced inflow control and on/off control
- Multi-Pore Geometry (MPG), or a bi-modal distribution metal mesh option, provides varied apertures throughout the filter media — ideal for when sand grain distribution would normally require gravel packing and when standalone screen is preferred
- Mid-joint break accommodating use of centralizers

### TECHNICAL DATA

**Available sizes** 3.500 to 6.625 in. (88.9 to 168.3 mm)

**Temperature rating** up to 650°F (343°C)

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<th>Base Pipe Weight</th>
<th>Perforations</th>
<th>Screen OD</th>
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<tr>
<td>6.625</td>
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<td>0.375</td>
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</table>

Metallurgy: Mesh available in 316L; base pipe available in a multitude of materials upon request. Multi-mode and single-mode weave micron ratings available.
SureFlo™

SureFlo™ is a premium metal mesh screen using diffusion bonding techniques which allows for the manufacture of the filter media with “NO” welding on the filter material itself. By its mere design, the product is very robust with the mechanical strengths approaching that of a direct wrap on a pipe wire jacket screen such as our ProWeld™ TOP product. SureFlo™ is designed to be run in rugged environments such as long open hole horizontal sections and extended reach drilling applications; the need to push/pull or rotate the downhole sand face completion assembly over cutting beds or drilling ledges to reach the desired depth is required here.

SureFlo™ offers flexibility when it comes to customized screen design. Its modular design creates an ease of manufacturing to accommodate accessories, such as centralizers, swell packers, and blank sections to fit each application. SureFlo offers the multi-layer filter media and protective perforated shroud diffusion bonded together as a single unit increasing the robustness of the end product.

APPLICATIONS

• Openhole
  • High pull-/push-off values required to reach target depth
  • Long horizontal sections
  • Standalone screen, SAS
  • Gravel pack

• Cased hole
  • High collapse resistance required
  • Frac-pack
  • Gravel-pack

Features and Benefits

• Combining the mesh filter layer and the protective shroud into a single component leads to increased overall strength
• Combined filter mesh, drainage mesh and protective shroud creating a monolithic robust fit for use assembly
• Filter lengths of four foot sections accommodate customization without impacting lead times
• No end rings required, reducing the overall outside diameter of SureFlo over 10% less than the customary premium mesh screens
• Optimized manufacturing process yielding significant cost savings to the end user
• Filter layer available in a multitude of configurations and micron sizes accommodating “fit for purpose” design
SureFlo™

TECHNICAL DATA

Available sizes
2.375 to 6.625 in. (60.3 to 168.3 mm)
Temperature rating
up to 650°F (343°C)

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Metallurgy: Mesh available in 316L and Alloy 20; base pipe available in a multitude of materials upon request.
SureFlo™ CT

SureFlo™ CT is a premium metal mesh screen designed for use in slim hole or coiled tubing applications. SureFlo™ CT offers a reduced outside diameter in a woven metal mesh design making it an excellent offering for remediation where tubular restrictions exist. SureFlo™ CT is equipped with a filter layer, plain square weave and a shroud all bonded together. The process of bonding creates a single unit and a much more robust offering.

SureFlo™ CT offers flexibility when it comes to customized screen design. Its modular design creates an ease of manufacturing to accommodate accessories such as centralizers, swellable packers and blank sections to fit each application. SureFlo™ CT offers the multilayer filter media and protective perforated shroud diffusion bonded together as a single unit increasing the robustness of the end product.

APPLICATIONS

- Remediate failed sand control
- Slimhole
- Tubing completions run on coiled tubing or wireline
- Vertical, deviated or openhole

Features and Benefits

- Combining the mesh filter layer and the protective shroud into a single component leads to increased overall strength.
- Combined filter mesh, drainage mesh and protective shroud creating a monolithic robust fit for use assembly.
- Filter lengths of four foot sections, accommodate customization without impacting lead times.
- No end rings required reducing the overall outside diameter of SureFlo™ CT over 10% less than the customary premium mesh screens.
- Optimized manufacturing process yielding significant cost savings to the end user.
- Filter layer available in a multitude of configurations and micron sizes accommodating “fit for purpose” design.
SureFlo™ CT

TECHNICAL DATA

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</table>

Metallurgy: Mesh available in 316L and Alloy 20; base pipe in a multitude of materials upon request.

REFERENCES

Wire-wrapped and premium well screens brochure
**DynaFlo™ FM**

The Superior Completion Services **DynaFlo™ FM** (Fixed Mesh) screens are heavy duty premium metal mesh sand-exclusion screens designed for use in long openhole horizontal completions and cased gravel/frac-packed environments.

**DynaFlo™ FM** screens are the result of a unique manufacturing process that efficiently forms and tightly secures the protective shroud, drainage layer and filter media around an inner support shroud layer. This tightly formed, well-anchored filtration media is ideally suited for downhole environments which can require a premium metal mesh screen with high burst and collapse ratings.

Superior quality manufacturing provides a screen with the highest quality, strength and durability. **DynaFlo™ FM** is a premium metal mesh screen offering the installation performance challenging that of wrap-on-pipe wire jacket screens. **DynaFlo™ FM** is an economical premium metal mesh screen solution that is customizable to meet your needs.

**APPLICATIONS**

- Long horizontal openhole completions
- Cased hole
  - High-rate water-packs
  - Frac-pack
- Vertical or deviated wellbore
- With Inflow Control Device (ICD)
- Sliding sleeve wrapped screens
- Injectors
- Producers

**Features and Benefits**

- Tightly bound filter media delivers a robust solution for high rate wells where vibration may be an issue
- Unique construction improves burst and collapse ratings of premium metal mesh screens
- The design of the DynaFlo™ FM accommodates any need for customization
DynaFlo™ FM

**TECHNICAL DATA**

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**SYSTEM COMPONENTS**

- Perforated base pipe
- Inner perforated shroud, 16 gauge standard size
  - 304Lss standard material; also available in higher alloys as required
  - Available in required gauge size to meet mechanical needs
- Filtration media
  - 316Lss standard material; also available in higher alloys as required
  - Available in various weave patterns
- Drainage/Separation layer
  - Standard in 20x20 (PSW); other size PSW’s available
  - Outer perforated shroud, 14 gauge standard size
  - 304Lss standard material; also available in higher alloys as required
  - Available in required gauge size to meet mechanical needs
DynaFlo™ Interceptor™

DynaFlo™ Interceptor™ is a premium metal mesh downhole sand exclusion device that employs a unique manufacturing process. This process enables the individual components to be constructed as an integral unit, creating a strong and durable product.

The DynaFlo™ Interceptor™ screen’s improved design enables it to perform in the most challenging of environments, including open hole horizontals, short radius wells, sidetracks and re-entries. DynaFlo™ Interceptor™ offers added protection for virtually any gravel pack/frac-pack application. It is equipped with an inner drainage wire wrap layer, a high inflow area woven filter media and a dimpled outer shroud to protect the filter layer from direct impact of solid-laden fluids. DynaFlo™ Interceptor™ can stand up to the harshest environments and still deliver impeccable filtering performance.

APPLICATIONS

- Long horizontal gravel packs
- Standalone screen (SAS) in openhole
- Horizontal wellbores
- Producing wells
- Injector wells
- High-rate water and frac-packs
- With ICD or AICD completions

Features and Benefits

- Available in a variety of micron ratings and metallurgy
  - Enables customizing for each and every application
- Equipped with an inner wire wrap drainage layer
  - Provides support for the mesh filtration layer offering it mechanical strength
- Mesh filtration layer
  - Assures maximum inflow area and filtration performance
  - Sized to gravel/proppant or PSD of reservoir grain sizes
- Dimple Shroud
  - Provides protection of filtration layer during installation and over the production life of cycle well
  - Delivers long term protection against direct impact of particles against mesh filtration layer & minimizes erosion effects
- Special manufacturing process that compresses all layers into one
  - Eliminates any welding or heat from welding filtration layer
# DynaFlo™ Interceptor™

## TECHNICAL DATA

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<th>Base Pipe OD</th>
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**DynaFlo™ Interceptor™ a Superior Energy - Completion Services Branded Product Manufactured by First Filter, Inc.**
DynaFlo™ DB

The Superior Completion Services DynaFlo™ Diffusion-Bonded (DB) Screens are heavy-duty premium sand-exclusion screens designed for use in gravel pack and standalone screen installations in cased and openhole environments. DB screens offer 30 to 40% greater surface area than deep media screens.

DynaFlo™ DB Well Screens incorporate DB-laminated filter media comprised of either three or four layers of wire mesh selected to provide accurate particle size control while maximizing flow rate and strength. The DB filter media is protected by an outer perforated shroud. The entire assembly is welded onto a specified base pipe to provide a rugged sand-exclusion screen. The base pipe is either perforated (standard) or non-perforated with special production control valves positioned as needed.

APPLICATIONS

• Sand control
• High-rate water packs, fracturing and openhole environments
• Vertical, deviated or horizontal wells
• Horizontal openhole completions with Inflow Control Device, ICD

Features and Benefits

- Extensive selection of media available for a wide range of formation sand sizes to optimize sand control effectiveness
- Fixed pore geometry enhances sand control under high operating pressures
- Enhanced screen properties include rigidity, strength and resistance to distortion, abrasion and vibration
- Mesh porosity: 55% minimum
- Multiple-layered design incorporates filtration and drainage layers into a single rigid cartridge
# DynaFlo™ DB

## TECHNICAL DATA

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</table>

Metallurgy: Mesh available in 316L or nickel alloy 20; base pipe available in a multitude of materials upon request. Nominal weave micron ratings: 75, 100, 125, 135, 150, 175, 200, 225, 250, 275.

**REFERENCES**

Wire-wrapped and premium well screens brochure
CoilFlo™ DB

The Superior Completion Services CoilFlo™ Diffusion-Bonded (DB) Screens are innovative sand control products that enable economical through-tubing completions to be performed with coiled tubing (CT) or wireline. DB screens offer 30 to 40% greater surface area than deep-media screens.

CoilFlo™ DB Well Screens incorporate DB laminated filter media comprised of either three or four layers of wire mesh selected to provide accurate particle size control while maximizing flow rate and strength. This filter media is protected by a perforated outer shroud.

APPLICATIONS

- Sand control
- Through-tubing completions on CT or wireline
- Vertical, deviated or horizontal wells

Features and Benefits

- Extensive selection of media available for a wide range of formation sand sizes to optimize sand control effectiveness
- Fixed pore geometry enhances sand control under high operating pressures
- Enhanced screen properties include rigidity, strength and resistance to distortion, abrasion and vibration
- Mesh porosity: 55% minimum
- Non-standard screen lengths are available upon request
- Multiple-layered design incorporates filtration and drainage layers into a single rigid cartridge
CoilFlo™ DB

TECHNICAL DATA

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<tr>
<th>Base Pipe OD</th>
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Metallurgy: Mesh available in 316L or nickel alloy 20; base pipe available in a multitude of materials upon request. Nominal weave micron ratings: 75, 100, 125, 135, 150, 175, 200, 225, 250, 275.

REFERENCES

Wire-wrapped and premium well screens brochure
UniFlo™ HELICAL Inflow Control Technology

The Superior Completions Services UniFlo™ Production/Injection Control Well Screens balance and distribute the flow of fluid along horizontal wellbores. This screen system includes an integral helical design inflow control device (ICD). In producing wells, drawdown pressure is distributed along the wellbore length to achieve balanced production. In injection wells, the injection pressure is distributed along the wellbore to achieve balanced injection.

Fluid flow distribution is achieved by creating flow resistance at selected locations along the wellbore. Since energy is conserved in closed systems, reducing the flowing kinetic energy at one location can increase the potential energy at another location. The UniFlo™ System can utilize orifice and nozzle designs, labyrinth designs, long channel designs and combinations of the various methods to create this resistance in both fixed and adjustable configurations.

In applications requiring sand control, the screens are configured to retain either the formation material or the gravel pack sand. In more competent rock applications, the screens are configured as debris filters.

Superior Completion Services can provide custom designs according to the precise needs of the application. This is accomplished with an in-house design tool that considers the fluid properties, flowing properties, required size, required pressure setting and flow velocities. Since these ICD's are designed precisely, accuracy of the application is not jeopardized by having to best-fit a limited number of ICD designs to the well.

APPLICATIONS

- Sand control
- Horizontal wellbores; producing and injection wells
- High-rate gas wells to reduce heading due to water encroachment, passive choking of the water
- Oil viscosities ≤ 2cP
UniFlo™ HELICAL
Inflow Control Technology

Features and Benefits

- Can be manufactured with direct-wrap jackets or with premium mesh filtration cartridges offering customization
- Uniform production/injection by reducing inflow at the heel and increasing inflow at the toe by resistance to flow of fluids passing through the long channels of the Helix
- Prevention of early water and/or gas breakthrough is accomplished by equalizing the influx of fluids along the well-bores lateral length
- Increase in ultimate total recovery
- Uniform injectivity via resistance to injection by the Helical design delivering equalized out flow of fluids from tubular to well-bore

TECHNICAL DATA

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<thead>
<tr>
<th>Base Pipe OD</th>
<th>Maximum OD</th>
</tr>
</thead>
<tbody>
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<tr>
<td>6.63</td>
<td>168.40</td>
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</tbody>
</table>

REFERENCES
Wire-wrapped and premium well screens brochure
UniFlo™ ROI for Consolidated Formations

The Superior Completion Services UniFlo™ Production/Injection Control Device for Consolidated Formations balance and distribute the flow of fluid along horizontal consolidated formations. This product includes an integral Radial Orifice ICD, ROI and is equipped with a wire wrap jacket debris barrier. In a producing well, drawdown pressure is distributed along the wellbore length to achieve balanced production. In an injection well, the injection pressure is distributed along the wellbore to achieve balanced injection.

Fluid flow distribution is achieved by creating flow resistance at selected locations along the wellbore. Since energy is conserved in closed systems, reducing the flowing kinetic energy at one location can increase the potential energy at another location. UniFlo™ ROI for Consolidated Formations utilizes tungsten carbide nozzles with the capability of having four nozzles spaced every 90° around the circumference of the base pipe outside diameter. These nozzles provide options and the flexibility of adjusting the orifice sizes prior to actual run in hole operations.

In applications requiring sand control, filter media is configured to retain either the formation material or the gravel pack sand. In more competent rock applications, such as carbonates. The filter media is configured as a debris barrier.

Superior Completion Services can provide custom designs according to the precise needs of the application. This is accomplished with an industry available design tool that considers the fluid properties, flowing properties, required size, required pressure setting and flow velocities. Since these ICDs are designed precisely, accuracy of the application is not jeopardized by having to best-fit a limited number of ICD designs to the well.

**APPLICATIONS**

- Consolidated formations
- Horizontal wellbores; producing and injection wells

**Features and Benefits**

- Threaded nozzles and a removable housing deliver just-in-time field adjust-ability
- Equipped with a debris barrier, typically a 100 gauge wire wrap jacket, solids are kept out of the UniFlo ROI Housing
- Pseudo-Steady State software enables fit for purpose design
UniFlo™ ROI for Consolidated Formations
Inflow Control Technology

TECHNICAL DATA

<table>
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<tr>
<th>Base Pipe OD</th>
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</table>

REFERENCES

Wire-wrapped and premium well screens brochure
Internal Screen Communication System (SCS)

The Superior Completion Services patented Screen Communication System (SCS) utilizes the annular space between the ID of the screen base pipe and the OD of the solid internal mandrel as a flow conduit for fluid returns during gravel pack operations and, later, production flow. The system interconnects this annular space among multiple screens with a special coupling to form a continuous flow path from the top of the screened interval to the bottom. This promotes efficient placement of the gravel pack media and can be optimized to facilitate uniform production or injection when flowing through a production sliding sleeve located beneath the screen.

APPLICATIONS

- Sand control
- Standalone screen with SelectFlo™ screen wrapped sleeves

Features and Benefits

- Allows circulation along the entire screen interval during gravel packing operations
- Allows gravel placement in the circulating mode using isolation screen systems
- Provides flow communication throughout entire screened interval during production

TECHNICAL DATA

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</table>

REFERENCES

Complete™ MST System data sheet
SureFlo™ SCS

Superior’s SureFlo™ Screen Communications System offers an innovative means of fluid leak-off at each blank section of screen across coupled connections, production sleeves, or circulating sleeves during pumping of gravel or frac-pack operations to eliminate void areas in the annular pack. The SureFlo™ Screen Communications System consists of an external SureFlo™ jacket and undercut end rings that are constructed of a single or multi-layered wire mesh filter bonded together with a perforated shroud creating a robust jacket. This jacket enables fluid passage from one screen to the next, external to the base pipe, in a Multizone Single-Trip (MST) application or in a standalone SelectFlo™ application when each screen does not have a sliding sleeve. This fluid path aids in creating a void free annular pack during a circulating pack or while taking returns at the end of a frac treatment. The jacket also serves as a filter mechanism during injection or production for those perforations located across from the blank sections of each screen assembly.

SureFlo™ Communication Jacket is temporarily secured in place on the pin end of each screen unit for shipping and handling purposes. Once each screen unit is properly torqued during installation, the jacket is then released and slid down over the connection and attaches to each screen unit at the undercut end ring locations. This results in a sand face completion with continuous filtering and fluid leak off capabilities along the entire perforated interval while also creating a continuous communication flow path underneath the screen jacket from top to bottom.

Features and Benefits

- System design maintains full screen base pipe ID
- Single or multi-layered filter across the coupling between screens provides a means for fluid communication which enables leak-off and dehydration ensuring a complete pack of the annulus
- Single or multi-layered filter jacket across the coupling between the screens allows enhanced production or injection flow at the perforations located across couplings eliminating convergent flow in the reservoir
- Extends the filtering and leak-off capability from one screen jacket to the next, creating one continuous screen filter from top to bottom maximizing perforation contact
- Innovative SureFlo™ Screen Communication System can incorporate production MSVs, (Multi-service Shifting Valve), base pipe and/or MS Circulating sleeves to provide maximum versatility and cost savings within the completion
### SureFlo™ SCS

**TECHNICAL DATA**

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<th>SureFlo™ External SCS</th>
<th>Base Pipe OD</th>
<th>ProWeld™ Precision TOP OD</th>
<th>DynaFlo™ DB OD</th>
<th>Vam TOP Box OD</th>
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</table>

**REFERENCES**

SelectFlo™ Screen Wrapped Sliding Sleeve
SelectFlo™ Screen-Wrapped Sliding Sleeve

The Superior Completion Services screen-wrapped sleeves can be manufactured with any screen design in the portfolio including the ProWeld TOP (Tight On Pipe). The finished good may be equipped with the Multiservice Valve (MSV), Pressure Actuated Circulation Valve (PACV), or any other sliding sleeve or valve with dimensions that adapt to the respective screen design. The design maximizes the systems inside diameter while enabling the functionality for selective production control. When run in conjunction with a Screen Communication System (SCS), multiple joints can be coupled together with at least one valve/sliding sleeve to ensure proper pack placement and alternative flow path for production. The system can be used in slim-hole applications and is run exclusively with the Complete™ Multizone Single-Trip (MST) System.

APPLICATIONS

- Cased hole completions
- Slimhole completions
- Multizone single-trip completions
- Openhole completions
- Where zonal control is required
- Ultra-deep completions

Features and Benefits

- Integral sliding sleeve/valve enables selective production/injection control
- Open/Closed feature delivers positive zonal isolation
- Unique shifting profiles accommodates the use of multiple sleeves in a single wellbore
- When run with an SCS allows multiple screen joints run with a single sliding sleeve/valve
SelectFlo™ Screen-Wrapped Sliding Sleeve

**TECHNICAL DATA**

Available sizes
- 2 1/16 to 7 in. (52.4 to 177.8 mm)

Differential pressure rating
- up to 15,000 psi (103.4 MPa)

Temperature rating
- up to 350°F (177°C)

### Screen Wrapped MSV

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### Screen Wrapped MSV for Multizone System

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**REFERENCES**

- ComPlete™ MST System data sheet
- Multi-profile Multi-Service Valve data sheet
- Multi-Service Valve data sheet
- Screen Communication System data sheet
- Wire-wrapped and premium well screens brochure
AI Packer: Swellable Isolation System

The Superior Completion Services AI-Packer provides a simple, effective, high integrity solution for cased and open hole zonal isolation.

Superior's AI, Autonomously Instinctive, swellable packer enables isolation in open hole and cased hole environments. The swellable nature of the rubber allows it to conform to micro variations in the bore hole, which, in combination with long wellbore contact length, provides a high integrity seal in openhole without exerting excessive force on the wellbore.

The AI-Packer has no moving parts, and requires no setting tools making reliability of this packer exceptionally high.

The AI-Packer is autonomously energized by the fluid present in the well, whether that be oil or water-based. Naturally instinctive processes of absorption and diffusion assisted by the complex engineering of the rubber matrix draw fluid inside the packer which then swells to contact the wellbore and provide a seal.

The AI-Packer is bonded to the base pipe for the full length of the swellable rubber element. This reduces possible leak paths providing a high-pressure, high-integrity seal. It provides effective isolation with either ball-activated sleeves or plug and perf completion designs.

Superior's AI-Packer provides annular isolation when run with ICD completions minimizing annular flow while offering segmentation of exposed shales.

APPLICATIONS

Superior’s AI-Packers are a simple more reliable means of isolations than alternatives such as inflatable packers and cementing in extended horizontal wells. Their robust design and simple operation mean they are a flexible solution in many situations where a pressure seal is required:

Specific applications include:

• Isolation for hydraulic fracturing (particularly in horizontal wellbores)
• Wellbore segmentation
• Flow diversion
• Isolation of sustained casing pressure
• Cement integrity (micro-annuli and mud channelling)
• Straddle systems
• Used with Inflow Control Devices as barriers to minimize annular flow and isolate shale sections
• Between screen zonal isolations for gravel-packing and sand screens
• Through-tubing isolation of perforations for refracturing
AI Packer: Swellable Isolation System

Features and Benefits

- Single trip, no running tools, self setting
- No moving parts, fully-bonded element
- Self-healing, conforms to wellbore
- Effective isolation providing enhanced stimulation and production performance
- Reduced rig time and personnel - reduced cost
- Reduced failure modes - robust design - increased reliability
- Long-term, high integrity seal

Specifications

- Single element design providing a high-integrity seal
- High-performing oil and water swellable elastomers
- Anti-extrusion end rings that also protect the rubber element while running in hole
- Temperature range 32°F-392°F (0°C-200°C)
- Differential pressure rating up to 10,000 psi (dependent on packer length)
- Design contact time 24 to 72 hours
- Design setting time 7 to 14 days
- Standard element lengths of 3, 5, 10, and 20 ft.
- Base pipe sourced from mills around the globe
- Chemical resistance to majority of common downhole fluids
## AI Packer: Swellable Isolation System

### TECHNICAL DATA

#### OPEN HOLE

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<th>Mandrel Size (inch mm)</th>
<th>Element OD (inch mm)</th>
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</table>

- **Element OD:** Diameter of the isolation system.
- **Mandrel Size:** Internal diameter of the mandrel.
- **Full Pressure Rating Up To:** Maximum pressure the system can handle.
- **Reduced Pressure Rating Up To:** Minimum pressure the system can handle.
**AI Slip-On: Swellable Isolation System**

A short, slide-on packer designed for flexibility of use, while still providing a high integrity seal.

The Superior Completion Services **AI Slip-On** swellable system offers a slip-on feature delivering a flexible and practical solution for field installation to client-supplied equipment. They operate in the same manner as the AI Packer with the swellable nature of the rubber allowing it to conform to micro variations in the bore hole. This, in isolation or combined with multiple **AI Slip-Ons**, provides a high-integrity seal in open hole without exerting excessive force on the wellbore.

The **AI Slip-On** is energized by the fluid present in the well, whether that be oil or water-based. Natural processes of absorption and diffusion assisted by the complex engineering of the rubber matrix draw the fluid inside the **Slip-On**, which then swells to contact the wellbore and provide a seal. A series of **AI Slip-Ons** can be installed to increase the pressure rating of the seal. They provide effective isolation in a wide range of scenarios and can be manufactured to suit any base pipe or screen size.

**APPLICATIONS**

**AI Slip-On Swellable System** provides a simple, more reliable means of isolation than alternatives such as inflatable packers and can be used in conjunction with cement for well assurance. Their robust design and simple operation mean they are a flexible solution in many situations where a pressure seal or fluid and debris barrier is required. Specific applications include:

- Used with ICD’s to eliminate annular flow and offer zonal isolation as required
- Between sleeve isolation for hydraulic fracturing
- Debris barrier
- Flow diversion
- Isolation of Sustained Casing Pressure
- Cement integrity (micro-annuli and mud channelling)
- Between screen zonal isolation for gravel packing and sand screens
AI Slip-On: Swellable Isolation System

Features and Benefits

- Slide-on design
- Single element (with integral end rings)
- Slim profile
- Operational flexibility due to in field installation
- Reduced cost option over packers
- Performance enhancement - the slim profile can be cemented around

SPECIFICATIONS

- Single element design providing a high-integrity seal
- Available in oil and water swellable elastomers
- Anti-extrusion end rings that also protect the rubber element while running in hole
- Temperature range 32°F-392°F (0°C-200°C)
- Differential pressure rating up to 3,000 psi
- Design contact time 24 to 72 hours
- Design setting time 7 to 14 days
- Standard element lengths of 1 ft. and 3 ft.
- Manufactured 100% in the USA
- Chemical resistance to majority of common downhole fluids

TECHNICAL DATA

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<th>Mandrel Size (inch)</th>
<th>Element OD (inch)</th>
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