

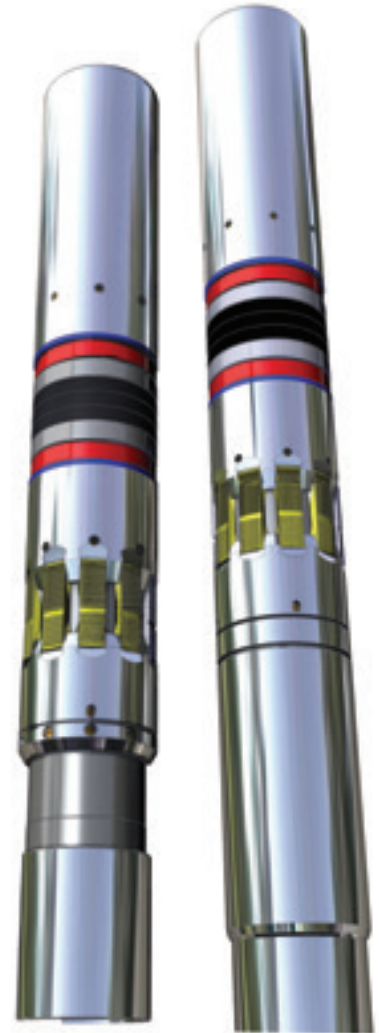
## Thermal Liner Hanger System

# Type E Thermal Solace Liner Hanger Packer

- High temperature and pressure applications
- SureSet™ — seal energized to replace seal efficiency over time
- Safe Slip™ — unique dovetail slips energized to maintain maximum extension regardless of top or bottom pressure
- Small footprint — a thermal tie-back adapter kit and one-piece internal mandrel eliminates the need to seal into a long tie-back, also allowing the hanger to be fished from the internal mandrel.
- THERMOator™ thermal element developed over 20 years of thermal experience and testing.
- Innovative pre-heating manufacturing process, results in less than 1% minimum initial seal
- Degradation
- Soft and hard release options available
- High torque
- Design meets ISO 14310
- Fewer sealing points than competitive hangers

The Solace Liner Hanger Packer features proprietary SureSet and SafeSlip technology making the Solace the most reliable hanger in both setting and retrieving operations. The Solace is designed to exceed expectations over a wide range of completion operations including, fracturing, gravel-packing, sand control, and primary completions. The Solace is conveyed via tubing or drill pipe with the Beast and EXTrack Running/Setting Tools. The Solace and associated setting tools are designed for extreme high torque operations, including rotating and drilling the liner into position.

The Solace Liner Hanger Packer is a premium retrievable liner top packer that can be used in a wide variety of applications: as a production or isolation seal bore packer; vertical, deviated, and horizontal wells; gravel packing; fracturing; and hanging liners. The packer is designed for primary conditions — operable in high pressures and temperatures up to 7,500 psi (51.7 MPa) and 400°F (204°C). Due to the static nature of the mechanism, the sealing material is formed from a material rated at 400°F (204°C) in primary applications. The Solace can be configured with Logan proprietary Thermo Seal Packing Element Technology for use in static and dynamic applications up to 675°F (357°C) and 2,500 psi (17.2 MPa).



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### **THERMONator Sealing Technology**

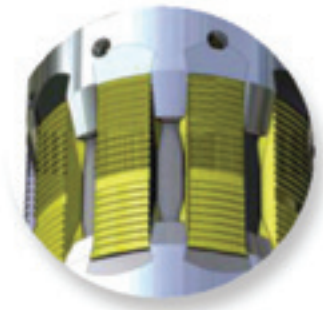
For high temperature applications, the Solace is configured with the proprietary THERMONator Seal which was tested at world renowned CFER Technologies test facility to 700°F and 2,500 psi. The THERMONator's seal material is chemically inert and is rated at 1,200°F and 3,000 psi. It is processed and heat treated to remove all filler materials to result in a seal that both seals better with solids impregnation in a dynamic state and also eliminates any risk of losing set force due to volume loss caused by material evaporation.

### **SureSet Feature**

The SureSet feature ensures that once set that the Solace's THERMONator sealing element is secured in the maximum extruded position and energized from both the top and bottom of the seal to provide maximum sealing efficiency over time. The SureSet's energization mechanism is designed to maintain sealing efficiency by transferring stored energy to the seal over the life of the install. An integral ratchet mechanism secures the set seal to ensure, that regardless of top or bottom pressure, that no energy is lost from the Solace's dovetail slips once set.

### **SafeSlip Feature**

The Solace's unique SafeSlip dovetail slips are neatly housed into the hanger during conveyance. The SafeSlip mechanism ensures that the hangers slips are engaged into the casing wall with maximum extension regardless of pressure into the seal top or bottom.



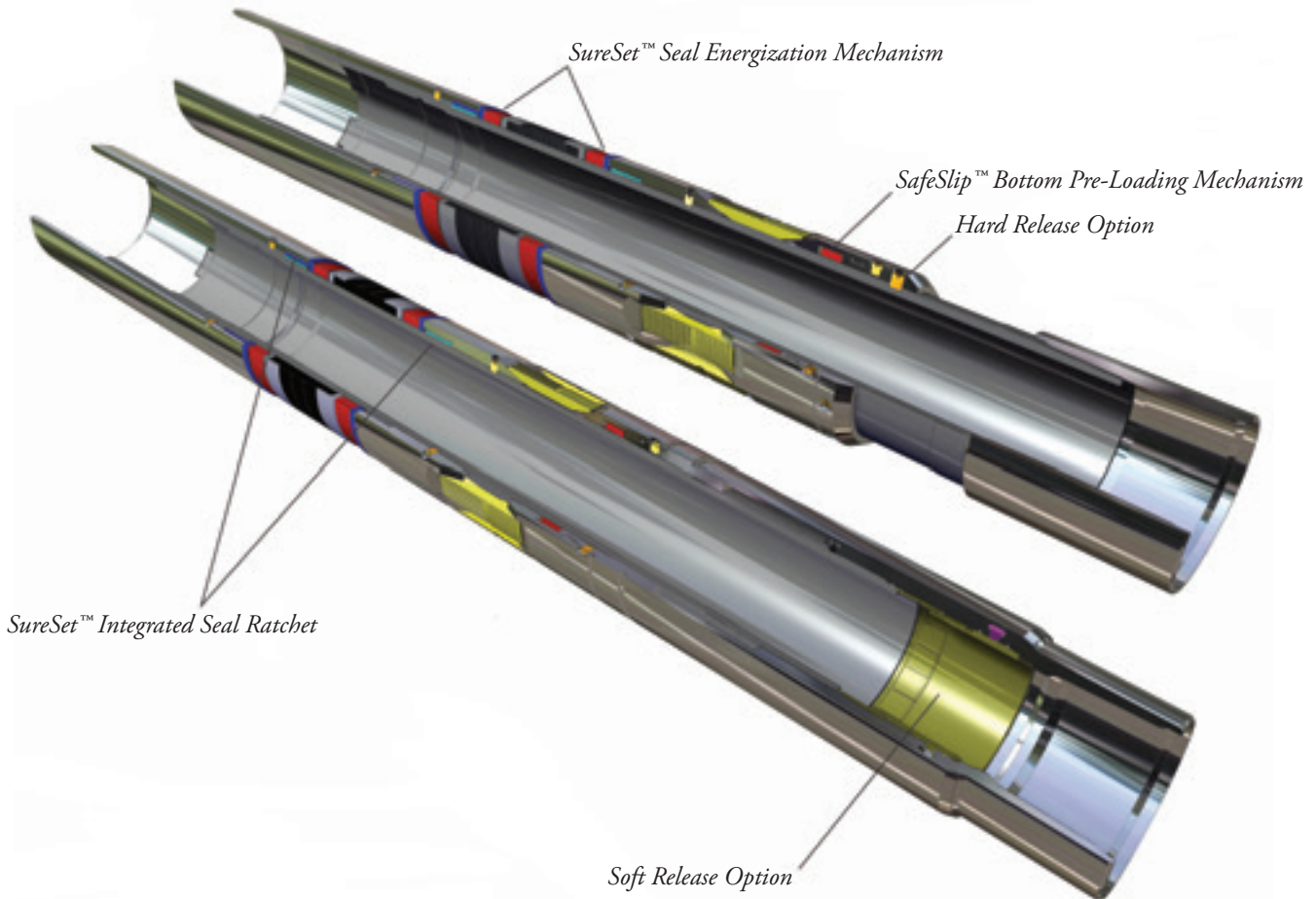
*Dovetail slip design for ultra reliable setting and retrieving*

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Solace Liner Hanger Packer Specifications

Liner x Casing (in)	Casing Size (in)	Casing Weight (lb/ft)	Liner Size (in)	Liner Weight (lb/ft)	Max OD (in)	Liner x Casing (mm)	Casing Size (mm)	Casing Weight (kg/m)	Liner Size (m)	Liner Weight (kg/m)	Max OD (mm)
4-1/2 x 6-5/8	6.63	28.00 – 32.00	4.50	9.50 – 15.10	5.38	114.3 x 177.8	168.4	41.67 – 47.62	114.3	14.14 – 22.47	136.60
	6.63	35.00	4.50	9.50 – 15.10	5.35		168.4	52.09	114.3	14.14 – 22.47	135.90
4-1/2 x 7	7.00	23.00 – 26.00	4.50	9.50 – 15.10	6.05	114.3 x 177.8	177.8	34.23 – 38.69	114.3	14.14 – 22.47	153.67
	7.00	26.00 – 29.00	4.50	9.50 – 15.10	5.95		177.8	38.69 – 43.16	114.3	14.14 – 22.47	151.13
	7.00	29.00 – 38.00	4.50	9.50 – 15.10	5.69		177.8	43.16 – 56.55	114.3	14.14 – 22.47	144.53
5 x 7	7.00	23.00 – 26.00	5.00	11.50 – 18.00	6.05	127.0 x 177.8	177.8	34.23 – 38.69	127.0	17.11 – 26.79	153.67
	7.00	26.00 – 29.00	5.00	11.50 – 18.00	5.95		177.8	38.69 – 43.16	127.0	17.11 – 26.79	151.13
	7.00	29.00 – 38.00	5.00	11.50 – 18.00	5.69		177.8	43.16 – 56.55	127.0	17.11 – 26.79	144.53
5 x 7-5/8	7.63	33.70 – 39.00	5.00	11.50 – 18.00	6.37	127.0 x 193.7	193.7	50.15 – 58.04	127.0	17.10 – 26.79	161.80
	7.63	24.00 – 29.70	5.50	14.00 – 23.00	6.65		193.7	35.72 – 44.20	139.7	20.83 – 34.23	168.91
5-1/2 x 7-5/8	7.63	29.70 – 33.70	5.50	14.00 – 23.00	6.56	139.7 x 193.7	193.7	44.20 – 50.15	139.7	20.83 – 34.23	166.62
	7.63	33.70 – 39.00	5.50	14.00 – 23.00	6.41		193.7	50.15 – 58.04	139.7	20.83 – 34.23	162.81
	9.63	29.30 – 40.00	7.00	17.00 – 35.00	8.43		244.5	43.60 – 59.53	177.8	25.30 – 52.09	214.12
7 x 9-5/8	9.63	40.00 – 53.50	7.00	17.00 – 35.00	8.25	177.8 x 244.5	244.5	59.53 – 79.62	177.8	25.30 – 52.09	209.50
	9.63	53.50 – 58.40	7.00	17.00 – 35.00	8.16		244.5	79.62 – 86.91	177.8	25.30 – 52.09	207.26
	9.63	29.30 – 40.00	7.63	24.00 – 47.30	8.59		193.7 x 244.5	244.5	43.60 – 59.53	193.7	35.72 – 67.41
9.63	47.00 – 53.50	7.63	24.00 – 47.30	8.31	244.5	69.94 – 79.62		193.7	35.72 – 67.41	211.07	



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