

SPM™ Flow Line Safety Restraint Systems

Safe, reliable, and proven

SPM™ Oil & Gas

A Caterpillar Company



The destructive force of an unrestrained flow line rupture, regardless of the cause, can be devastating and catastrophic to both people and equipment. The SPM™ Flow Line Safety Restraint (FSR) system is one of the industry's most utilized restraint systems designed to reduce the area of danger around high-pressure flow line disengagements. Operators and service companies have relied on the SPM™ FSR system to enhance safety during pumping operations.

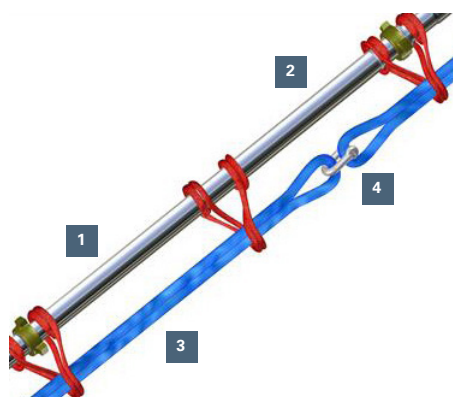
Product innovation, customer collaboration and a commitment to industry safety were the driving forces behind the development of this temporary flow line restraint product in 2000.

How the SPM™ FSR Works

The SPM™ FSR system utilizes interlocking synthetic loops strung along the length of the flow line and attached to critical points of the flow line through smaller loops. This assembly is then anchored to a suitable structural tie-down. Ribs and spines of the system transmit separation forces to the anchor point and restrict flow line movement and help dissipate energy.

Single Duty SPM™ FSR System

The SPM™ FSR system is available in a single duty rating, suitable for piping sizes up to 4" with a pressure rating of 15,000 psi. The system is flexible enough for a variety of flow line configurations and can be easily transported. All models are suitable for energized fluid, CO₂ and nitrogen operations.



- 1 Flow line piping
- 2 Rib
- 3 Spine
- 4 Shackle

Features and Benefits

- Proven effectiveness
- Extreme strength and reliability
- Flexible and lightweight
- Easy to install and maintain
- Applicable for both fluid and gas pumping operations
- Easy to transport
- Ongoing SPM™ Oil & Gas support

Size and Pressure Ratings

Nominal Iron Size	Pressure (psi)
2"	30,000 & below
3"	20,000 & below
4"	15,000 & below

These load ratings are valid for gas and liquids in both energized and non-energized services.

Size and Pressure Ratings

Minimum	-30° C
Maximum	110° C

US Patent 6,481,457

UK Patent 2,370,869



Left: Destructive testing conducted with a designed failure at 22,500 psi on up to 4" iron utilizing SPM™ FSR

Right: Testing validated SPM™ FSR and proved ability to reduce the danger area around high pressure hydraulic fracturing operations.



Demonstrated Performance

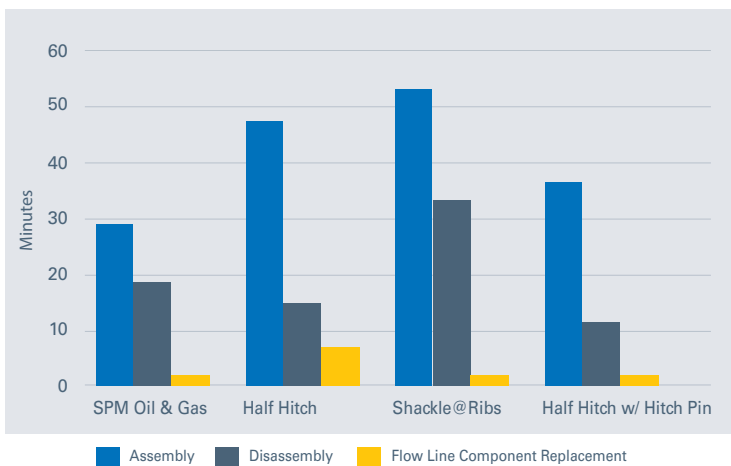
The SPM™ FSR system has been used in both onshore and offshore applications around the world since 2000 to increase safety during pumping operations. It has been tested and honored by the industry for its innovation and performance.

- “Best Mechanical Engineering Innovation Award” from the American Society of Mechanical Engineering in 2002
- Accepted by WorkSafeBC (the Workers’ Compensation Board of British Columbia) as in compliance with a government mandate that flow line piping be anchored and restrained during well testing or stimulation operations
- Mandated by several major E&P companies for use during pumping operations

Additionally, SPM™ Oil & Gas recently reinvested almost \$500,000 into practical performance testing of this product line. In conjunction with an independent third party research institute, SPM™ Oil & Gas has demonstrated this product’s first in class technical design and confirmed its position as the market leader through side-by-side comparative assembly (see chart above) and destructive field testing.

SPM™ FSR Rental Program

SPM™ Oil & Gas maintains a fleet of rental FSR units at its strategically located service centers around the globe for onsite delivery. The rental fleet undergoes inspection to verify that all components are ready when needed and meet performance standards. Each component features identification and inspection badges that verify its compliance with regulations. Rental storage trailers are also available to store and organize the SPM™ FSR system and make transport of component parts safe and convenient to the customer’s work site. Trained SPM™ Oil & Gas technicians are available to provide on-site rig up and tear down services.



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