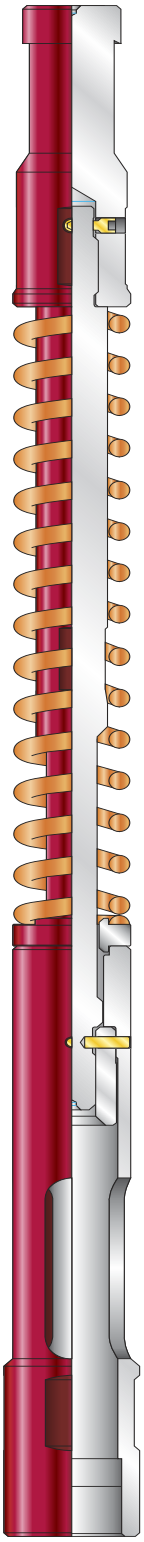
Robust Bottomhole Bumper Spring Assembly



Weatherford's new robust bottomhole bumper spring (BHBS) assembly has been designed to address all of the concerns typically associated with conventional bottomhole springs.

- Flow restrictions
- Spring compression and damage while trying to set in seating nipples
- Spring damage due to total spring compression/collapse at plunger arrival
- Retrieval difficulties

As a result of this advanced technology, Weatherford's BHBS is the industry's most robust, most effective, longest lasting, and easiest-to-retrieve bottomhole bumper spring.

The basic operating principle involves the spring being set in or near the end of the tubing to absorb the shock of the plunger falling to the bottom of the tubing.

Applications

- All plunger-lift operations

Features, Advantages and Benefits

- Increased flow area through the BHBS decreases the restriction and pressure drop across the BHBS, increasing overall production.
- The inclusion of a running/setting shear pin maintains assembly rigidity, spring protection, and positive seating while jarring down with slickline tools to set in seating nipples, improving the mechanical integrity and life of the BHBS and plunger while saving rig time and associated costs.

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Features, Advantages and Benefits *(continued)*

- Increased spring travel increases shock-absorption capacity, improving the mechanical integrity and life of the BHBS and plunger while saving rig time and associated costs.
- The inclusion of a hard stop prevents total spring collapse, improving mechanical integrity and life of the BHBS and plunger.
- The increased tensile strength of the pull rod improves the pulling/jarring force limit before rod failure, enhancing the ability to retrieve the BHBS.
- The BHBS is designed for a precise tensile-failure point to control the fail points when stuck to facilitate recovery of all components with standard slickline tools, improving the ability to fish when the BHBS is stuck, saving rig time and associated costs.