

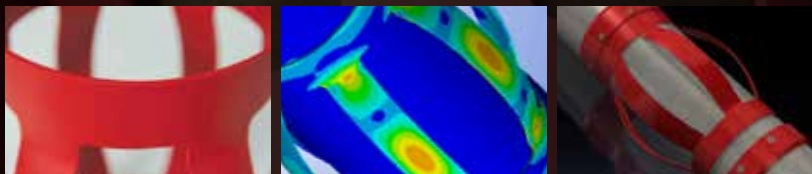


WELL CONSTRUCTION

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VariForm™ Centralizers

Enabling a lifetime of well integrity through optimal centralization and standoff



“Cementing is 80% placement, and placement is 80% centralization. If you can’t centralize the pipe and place cement in more than 99% of the annular areas—you can’t expect to achieve reliable long-term isolation.”

– Mike Cowan, Senior Research Fellow, The University of Texas at Austin

Repeatable Precision

Trust the global leader and innovator in centralizers to enhance your wellbore security

A secure cement job is the backbone of well integrity. We believe that nothing impacts the quality of a cement job as much as proper centralization of a casing string. In fact, our company was founded on that very principal.

Drawing on 75 years of experience and engineering, VariForm™ centralizers are our latest advancement in precise centralization. These one-piece centralizers are the result of our 100%-traceable and stringent German manufacturing process. VariForm centralizers have a single, metallurgically invisible weld with no hinges or mechanical connections.

Our engineering, manufacturing, and customizable designs enable VariForm centralizers to survive the most demanding run-in-hole (RIH) conditions. The bows can collapse for a nearly flat run-in, and then, upon landing, they restore to full OD to provide superior standoff with no sacrifice to performance properties. These tools provide exact casing centralization in standard-gauge, under-reamed holes, horizontal sections, and close-tolerance sections.

We offer a comprehensive selection of standard sizes and designs, or we can customize a centralizer for any variable in your well plan.

Only Weatherford
centralizer experience spans

75 Years
and millions of tools



A lifetime of well integrity begins with VariForm™ centralizers

We engineered VariForm centralizers for durability. Our fully automated manufacturing process delivers a centralizer that achieves balance between starting and running forces in the restriction, and standoff ratio in the openhole:

Variable Design

Our single-piece design is fully customizable. We can change the shape of the centralizer to achieve any performance need, including any rebalance of starting, running, and restoring forces.

Enhanced Bow Rigidity

We designed VariForm centralizers to withstand demanding run-in conditions. The contoured bow profile reduces drag and prevents damage when running through restrictions. The shape is also engineered to strengthen the bow and deliver increased rigidity.

Quality Materials

We provide quality control over every step of our manufacturing. We confirm the mechanical properties of every batch of steel. We specify only top-quality European and American alloys that are engineered to stringent standards. And we maintain exact control of the heat-treating process.

Testing Beyond Industry Standards

API 10 D is merely our starting point. Using finite-element analysis and a battery of exacting tests, we predict how our designs will perform before we build them. And because we control and evaluate every step in the manufacturing process, we provide 100% traceability for each centralizer.

Predictable Performance

Our manufacturing process ensures consistent performance with each run. We archive performance properties in our CentraPro Plus® database, which models standoff, running forces, and hook-load predictions.

Metallurgically Invisible Welds

The unique nature of our fully automated welding process uses no fillers, which leaves a single, resilient weld that is nearly indistinguishable from the parent metal.



We test the centralizers the way they are run to ensure exceptional performance.

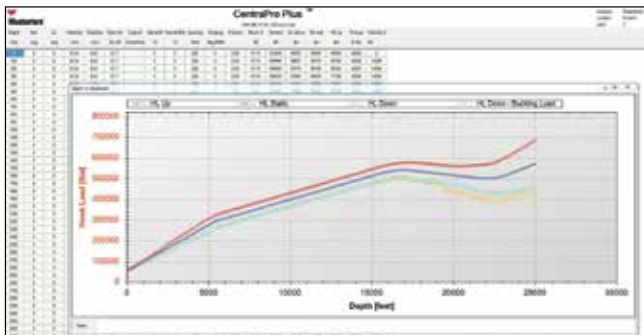


We instill confidence in your centralization program

Our German manufacturing facility is efficient and precise

Our manufacturing process is 100% robotically automated with extremely tight tolerances. Coupled with our industry-leading testing regime, our process ensures that every centralizer from the first to 1,000th is exactly the same. Closely monitored controls detect manufacturing anomalies before the part is finished, and all VariForm products meet or exceed the API 10 D standard.

The single-piece VariForm centralizer is built with a forming process that assures a perfect fit on casing. The single-seam weld is durable and withstands the toughest RIH conditions. Metallurgical tests of cross-sectional weld samples indicate a minimal heat-affected zone that is identical to the parent metal.



We offer planning software to ensure proper centralizer placement

Our CentraPro Plus centralizer placement system simulates your wellbore to provide optimal selection and placement of centralizers and stop collars. Among the factors included in the simulation are the lateral force at any given location based on borehole geometry, buoyed string weights, and tension forces; the reaction of the centralizer exposed to these forces based on actual test data for each pipe-size/hole-size combination; and the sag between centralizers based on the elasticity of the pipe and a three-dimensional vector analysis of weight and tension components.





VariForm centralizers are available in three distinct versions

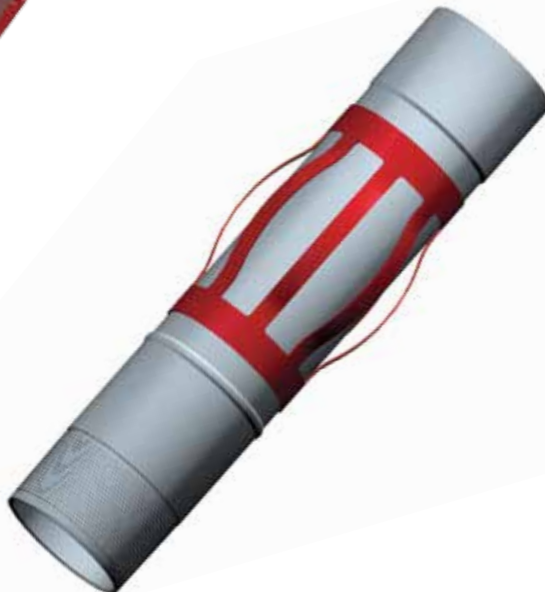
VariForm UR Centralizer

This version runs through tight annular restrictions. The bows can collapse for a nearly flat run-in, and then restore to full OD upon landing—with no sacrifice to performance properties—to provide superior standoff. We offer both standard and customized designs.



VariForm Centralizer

These tools feature an OD that is equal to the expected hole size, which results in little to no starting and running forces. Even though they are designed to be very stiff for good standoff and restoring forces in the open hole, VariForm centralizers also deliver flexibility for passing through wellbore restrictions. We offer both standard and customized designs.



VariForm Centralizer Sub

The VariForm centralizer sub can run in places that conventional centralizers simply can't. The sub is ideal for close-tolerance casing restrictions as narrow as 0.125 in., yet it still restores to centralize under-reamed openhole sections of 4 in. or more. We mount a VariForm centralizer using a patent-pending technique, which creates the industry's only sub that pulls the centralizer into the wellbore, rather than pushing. We offer both standard and customized designs.

Application Guide

As part of the largest selection of centralizers, our family of VariForm bowspring centralizers offers options to address a variety of casing and running challenges to get you to total depth.

| | VariForm | | |
|--|----------|----|-----|
| | Regular | UR | Sub |
| Vertical Strings | ● | ● | ● |
| Deviated Strings | ● | ● | ● |
| Horizontal Strings | ● | ● | ● |
| ERD Strings | ● | ● | ● |
| Rotating Casing | ● | ● | ● |
| Reciprocating Casing | ● | ● | ● |
| Cased Hole | ● | ● | ● |
| Open Hole | ● | ● | ● |
| Under-reamed: <0.875 in. (2.225 mm) Restriction: >1.5 in (38.1 mm) | | ● | ● |
| Under-reamed: restriction \leq 0.875 in. (2.225 mm) above casing OD | | | ● |
| Oversized/Washed-Out Hole | ● | ● | ● |
| Uncemented Completion | ● | ● | ● |

We complement our centralizer selection with **the industry's widest selection of stop collars**

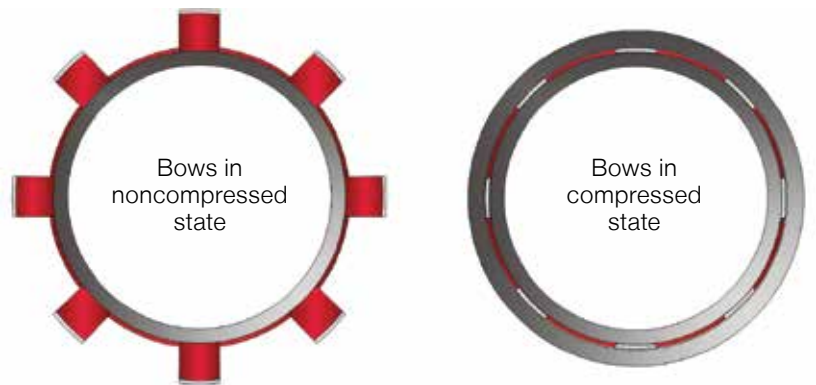
● Best choice ● Can be used without limiting operations □ Not recommended

How VariForm centralizer subs work

Although all centralizers in the VariForm family pass through tight restrictions and provide high standoff, the VariForm centralizer sub is ideal for ultratight restrictions. This sub features bowsprings that compress when passing through nearly any well restriction, and then restores to full OD upon landing. The patent-pending VariForm centralizer sub allows for full rotation with a minimum of torque.

Centralizer Sub

*Patent Pending



Bows in noncompressed state.

Bows in compressed state. Bows collapse flush to the body.

There's more to cementing a well than just cement.

The challenging wells you cement today must provide a lifetime of integrity. Our far-reaching family of centralizers is just one part of a product portfolio and service suite that can help you construct wells in the toughest environments and make them last. We can help you properly install and centralize casing, place cement optimally, and achieve long-term isolation.



Casing centralization

Increase stand-off, prevent differential sticking, and eliminate channeling

- Casing accessories
- Centralizers
- Placement software services



Casing installation

Reach total depth safely and efficiently

- Float equipment
- Surge reduction systems
- Torque-and-drag reduction



Wellbore isolation

Prevent fluid migration and reduce well construction costs

- Inflatable packers
- Isolation systems
- Swellable packers



Integrity confirmation

Measure cement bond quality

- Cement-bond-logging tools



Cement placement

Ensure effective cement slurry displacement

- Stage cementing tools
- Wiper plugs and darts



The VariForm™ family of centralizers and centralizer subs delivers repeatable precision in wellbore centralization. To learn how our services and technologies can work for you, contact your authorized Weatherford representative, or visit us at **weatherford.com**.



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