



COMMITMENT TOWARDS PERFECTION

COMPLETE CEMENTING SOLUTION >>



www.sledgehammerasia.com





Commitment towards perfection



*"A formula for success:
Rise early...work hard...strike oil..."*



“Sledgehammer leads the way in offshore and onshore cementing and float apparatus, and our hallmark is quality and unrivalled expertise in our field.”

Leaders in innovative solutions

Sledgehammer is a leading API & ISO 14001, 18001, 9001 certified manufacturer of cementing equipment. Our products include Centralizers; Stop Collars; Reamer Shoes; Float Shoes; Float Collars; Stage Cementing Tools; Bridge Plugs and Cement Retainers. We enjoy the unrivalled reputation of being the largest producer and supplier of offshore and onshore cementing and float apparatus across Asia and pride ourselves as the leading reliable source of original and quality equipment.

We are recognized as industry pioneers in design and production and provide support and innovative solutions for our customers. Our pursuit for perfection has driven our global presence and enabled us to penetrate distant and diverse markets. As a result, we are now specialized leaders in what is a highly competitive business.

Starting as a single equipment manufacturing company, Sledgehammer has now grown into a formidable and widely respected organization. Nowadays we serve a vast client base and assemble and fabricate a comprehensive range of cementing equipment with a wide range of production that encompasses everything from 2 7/8" to 30" size.

Driven by expertise, our expansion continues to grow and in addition to a new itinerary of production facilities, we have also established a new joint venture facility in Malaysia & the Kingdom of Saudi Arabia. As established industry leaders we will continue to expand market share in the rapidly growing South East Asia and the Gulf region.

About us

Largest manufacturing company of Asia, who have capability of manufacturing almost all standard and non standard sizes of cementing products.



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Stab-in Float Shoe w/o Latch in Profile
Stab-in Float Collar w/o Latch in Profile
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Differential Fill-up Float Shoe
Differential Fill-up Float Collar
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Up Jet / Side Jet / Down Jet Float Collar
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Cementing Head/ Bridge Plug/ Cement Retainer
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API Modified High Pressure Thread Compound
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Our Vision

We strive for perfection and provide unrivalled product line expertise and support to our clients. Our pragmatic and proactive approach has helped us to establish benchmarks of quality and reliability for ourselves and for the competition. Innovation and excellence are our goals with standards of quality that exceed expectation. The equipment manufactured and supplied by SledgeHammer stands out as the finest because of its ease of usage and cost effective operations and maintenance.



Our vision

Our business and management principles are well informed and are driven by a commitment to fostering and sustaining expertise by continually striving to be the best in our field. As a result, we have developed a loyal customer base who are always assured of excellence. We continually strive to take this excellence to new heights by setting benchmarks and offering improved resources to specialists in our industry. These aspects have earned us reputation among our clients and have helped us to consolidate our position on the global map of the specialized cementing equipment and accessories manufacturers.

In our pursuit for perfection and growth we never overlook social commitments and take due care of the community and environment. We follow and rigorously adhere to work place safety and environmental norms in order to ensure best practice and respect for our employees, the community and the world around us.



The Advantages of Sledgehammer

SledgeHammer has established experience in addressing the requirements of its diverse clientele in both offshore and onshore drilling locations. This expansive experience means that we have been able to fine-tune our manufacturing process to address the specific needs of this diverse customer base. As a result, we are now global leaders and have become widely acclaimed as a one-stop-shop for casing and cementing apparatus requirements.



Advantages

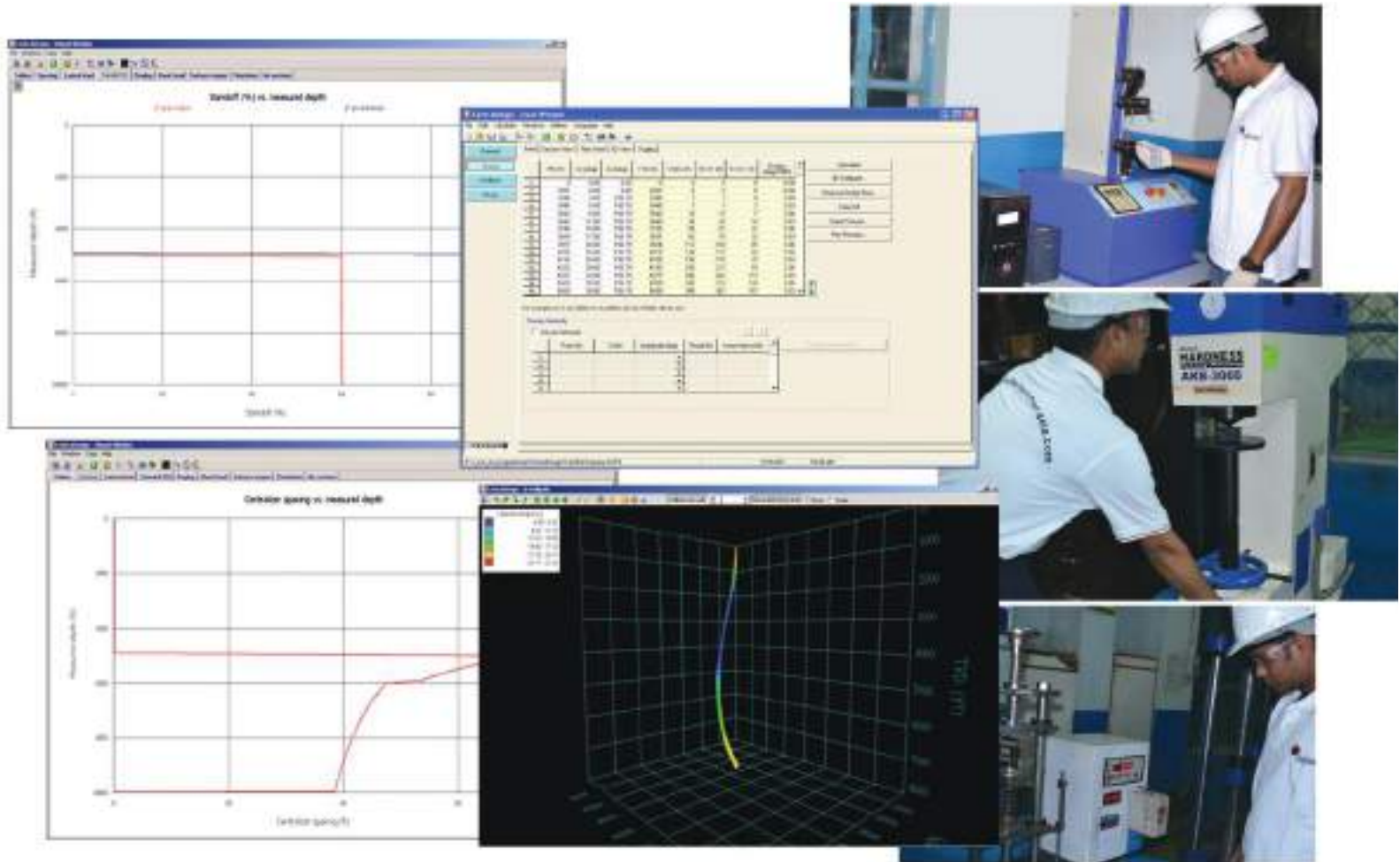
Manufacturing state-of-the-art equipment has become the hallmark of SledgeHammer, and we continue to strive to ensure that quality remains high on the agenda in accordance, and beyond, the global standards and norms. The products that we manufacture go through extensive tests and analysis (as per prescribed global conventions for testing) in order to attain the finest results and solutions. Our attention to detail through our testing capabilities, which includes flow loop, restoring force, friction test, collapse & burst testing, robotics welding and robotics paint and powder coating, demonstrates our unrivalled high standards.

With a firm commitment to customer satisfaction, SledgeHammer strives to deliver results every time. Our commitment to quality, cost effectiveness, and efficient customer service ensures that we continue to grow and position ourselves as leaders in our field.



Putting Quality Control, Assurance & Certifications First

At SledgeHammer we consistently bank on the policy of “What starts perfect, ends perfect” and this is deeply embedded in all our working procedures and processes. We are proud that we have established manufacturing and management practices which strictly adhere to global standards for Quality Assurance (QA) and Quality Control (QC). The process of assuring and controlling quality starts at the initial stage of raw material selection and procurement. Testing and analyzing various aspects of the material being used in the manufacturing is deemed critical to ensure high quality



Quality & Certifications

production. We make sure that every process is carried out as per the requirements of quality control regulations.

Pre and post-production simulation and random testing continue to define and be the hallmark of SledgeHammer's commitment to excellence. It has helped us to manufacture premium products and has sustained our QA capabilities. The simulation and testing is carried out at various levels i.e. initial stages of manufacture design with the help of up-to-date 'Centralizer Placement Software' and 'Stand-off Calculation Software'. This is complemented by performance testing as per API RP 10 F recommended testing chapter. Our QC laboratories are fully equipped with the most modern and up-to-date load testing equipment (mechanical, pneumatic and hydraulic) that helps us to critically analyze our products.

Integrating globally acceptable QC norms into assembly lines is part of larger quality control management at SledgeHammer and we are rigorous in ensuring that our products are the finest.

Recognitions and certifications include:

- API 10D
- API 5CT
- ISO 9001
- Russian Product (GOST)
- OHSAS 18001
- ISO14001
- SONCAP



Key Players in The Global Market

SledgeHammer continues to grow and increase its presence and market share across the globe. Our commitment to quality and excellence, underpinned by our expertise and leadership in the cement industry, has driven our success and earned us prestigious accolades. As a result, we have a loyal and elite client base which includes some of the world's foremost companies in the oil industry. SledgeHammer has a number of productive and profitable joint ventures:



Joint Ventures

- 1) SledgeHammer Malaysia SDN. BHD. (Manufacturing Unit in Malaysia)
- 2) SledgeHammer Gulf DMCC (Sales Office in UAE)
- 3) SledgeHammer Oil Tools International (Manufacturing Unit in Kingdom of Saudi Arabia)
- 4) Manufacturing facility in Sultanate of Oman planned to open in 2015
- 5) Sales office & warehousing will be established in USA in 2015



Achieving Excellence in The Industry

As leaders in the industry, Sledgehammer prides itself on its commitment to excellence and its achievement in creating benchmarks. We provide reassuring service and quality to our clients each time, every time and our formidable facilities, products and achievements include:

- Robotics Welding Plant
- Robotics Powder Coating Plant
- Digitally Controlled Heat Treatment Furnace



Achievements

- Back Pressure Testing Cell up to 20,000 psi
- Float Valve with Back Pressure Rating of 12,500 psi
- Special High Temperature Rubber of 300 ° Celsius
- Production of 40,000 Centralizers and 1,000 pieces of Float Equipment per month
- Complete Testing Facility for Rubber Parts
- API RP 10 F Flow Loop Test Cell
- Testing Cell as per API 10D & API TR5
- Manufacturing Unit spanning 26,000 sq. meters
- In House Coupling Feed Stock Manufacturing Plant



*"Standard Straight
Bow Centralizer..."*



"Bow Spring Centralizer..."

SH01

Hinged Non-Welded Bow Spring Centralizer

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Non-Welded Bow Spring Centralizers are manufactured using state-of-the-art engineering techniques. The commitment to quality assurance ensures that they are developed to exceed API 10D specification for use in the most demanding of conditions. The Centralizers are specially designed for vertical, horizontal and deviated wells where low starting forces as well as high restoring forces are required.

These premium quality bows are fabricated using double rolled alloy steel and are hot formed in a controlled 'Heat Treatment Plant' to ensure uniform hardness and excellent spring action. End Collars are designed with a self-locking action and are easy to assemble, time saving and have excellent grip. The five standard sized bows can be configured to any hole and they undergo iron phosphate coating process to prevent corrosion followed by a specialized coating of polyester powder.

Hinged Non-Welded Bow Spring Centralizers can be shipped in half assembled condition to ensure competitive and economical shipping and storage costs. They are available in 4 1/2" to 20" sizes. Any special sizes or combinations can be made available on request.

SS01

Hinged Non-Welded Stainless Steel Centralizer

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Hinged Non-welded Stainless Steel Centralizers are specialized Centralizers designed to meet situations where corrosion and contamination might be present. Their specialized properties mean that they are also ideal for usage in water wells.

These premium quality centralizers are manufactured using 100% stainless steel together with stainless steel nails and are hot formed in a Heat Treatment Plant to achieve uniform hardness and unrivalled spring action. The End Collars have a self-locking action and are easy to assemble. A choice of five standard size bows ensures that they can be configured to suit any hole diameter. In addition, their design prevents them from striking against the casing collars.

Hinged Non-Welded Stainless Steel Centralizers can be shipped in half assembled condition to ensure reduced shipping and storage costs. They are available in 4 1/2" to 20" sizes. Any special sizes or combinations can be made available upon request.



"Bow Spring Centralizer..."

SH02

Hinged Welded Bow Spring Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



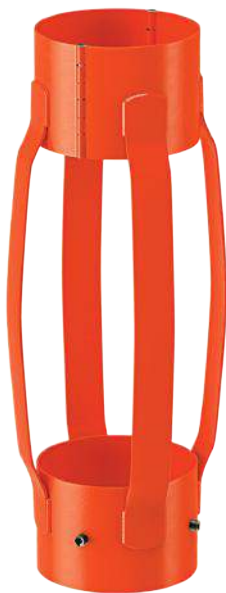
SledgeHammer's Hinged Welded Spring Bow Centralizers are high quality welded products, which meet or exceed API 10D specifications. They are designed for high restoring forces combined with low starting forces essential for centralizing casing pipes. They are manufactured and heat-treated under controlled temperature and time cycles ensuring that the Bow Springs are strongly welded to the End Collar. This ensures minimum distortion and maximum rigidity and integral hinges folded on the inside stay intact even under extreme stress. In addition, the End Collars are designed with a reinforcing rib stamped into the End Collar to ensure maximum strength.

SledgeHammer Hinged Welded Spring Bow Centralizers are generally shipped in half assembled condition to ensure reduced costs in terms of shipping and storage. A selection of Bows are available in seven standard bow heights designed to ensure optimal starting and restoring force. All Centralizers undergo a special iron phosphate coating process to prevent corrosion and are then coated with a special polyester powder. Sizes availability ranges from 3 1/2" to 20" and any special sizes or combinations can be supplied upon request.

SH03

Slip on Welded Bow Spring Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Welded Slip On Spring Bow Centralizers share all the operational and design features of Hinged Welded Centralizers. The key difference is that the End Collars do not have hinges and instead 'slip' onto the casing. The collars are specially designed with roll-formed peripheral ridges that provide extra rigidity and can be accompanied by set screws for elimination of Stop Collars.

The Centralizers are available in a choice of seven standard bow heights for optimal starting and restoring force. All Centralizers undergo a special iron phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

Sledgehammer's Slip On Welded Bow Spring Centralizers are shipped in assembled condition only. They are available in a number of sizes ranging from 3 1/2" to 20". Special sizes or combinations are available on request.



"Bow Spring Centralizer..."

SH03-C

Slip on Welded Single Piece Bow Spring Sledge Chakra

Available in 4 1/2" to 20 " sizes



SledgeHammer's Slip-on Welded Single Piece Bow Spring Sledge Chakra is constructed from one piece ensuring high restoring force, uniform hardness and shock absorption. The advantage of the single piece centralizer is that its smooth corner radius reduces friction ensuring that fluids can flow more easily without obstruction.

All Centralizers undergo a special iron phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

Slip-On Welded Single Piece Bow Spring Sledge Chakras are shipped in assembled condition only. They are available in all sizes ranging from 4 1/2" to 20". Any special sizes or combination can be made available upon request.

SH49

Centralizer Sub

Available in 4 1/2" to 20 " sizes



Sledgehammer's Centralizer Subs are used to allow the operator to run centering devices into wellbores where standard tolerance Centralizers are restricted due to Stop Collars not being capable of withstanding drag and fit limitations.

Bow Springs can be supplied in almost any casing size, grade or thread and for use in the most challenging wellbore configurations.

The Bow Spring Centralizer can pass through annular spaces below 3/4" per side without compromising the centralizer's performance in under-reamed hole sections.



"Bow Spring Centralizer..."

SH04

Hinged Non Welded Bow Spring Turbolizer

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Hinged Non Welded Turbolizer has all of the characteristics of regular centralizers as far as starting force is concerned. The key difference is that the Turbolizer has deflector blades fitted on Standard Bow Springs.

These blades or fins are specially made of heat-treated spring steel and are designed and manufactured to meet API 10D specifications. The function of the fins is to generate turbulence in the cement slurry during pumping operations. In addition, the fin direction can be adjusted clockwise or anticlockwise to assist uniform cement displacement. The spring action of blades makes them flexible, reducing damage while moving downhole. This device improves the cleaning action of drilling fluids; distributes the cement slurry into well bore irregularities and minimizes channeling. Another feature is that the bows are fitted on a uniquely designed self locking End Collar with a stop device.

Every hinged Non-Welded Bow Spring Turbolizer undergoes a special iron phosphate coating process to protect it from corrosion and are then coated with a special polyester powder. The product can be shipped in semi-assembled condition to assist shipping and storage costs. They are available in 4 1/2" to 20" sizes. Any special sizes or combination can be made available upon request.

SH05

Hinged Welded Bow Spring Turbolizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Hinged Welded Bow Spring Turbolizer induces a spiral flow pattern in the slurry thereby increasing displacement efficiency. It is ideal for deviated and horizontal wells and improves the cleaning action of drilling fluids, distributes the cement slurry into well bore irregularities, and minimizes channeling. Deflector blades, which are fitted onto Standard Bow Springs, help induce turbulence in the cement slurry during pumping operations.

The blades or fins are constructed from heat-treated spring steel under special conditions that meet AOI 10D specifications. The fin direction can be adjusted both clockwise and anticlockwise to create uniform displacement and the spring action ensures flexibility that minimizes damage while moving downhole. The Bow Springs are strongly welded to the end collar ensuring ultimate strength and uniformity in every weld. The End Collar is also designed with a reinforcing rib stamped inside to give optimal structural toughness and a stop device. Further strength is created by the integral hinge that is able to undergo extreme stress.

All products undergo a special iron phosphate coating process to inhibit corrosion and are then coated with a special polyester powder

They can be shipped in half assembled condition for to reduce shipping and storage costs and are available in 3 1/2" to 20" sizes. Any special sizes or combinations can be made available upon request.



"Bow Spring Centralizer..."

SH06

Slip On Welded Bow Spring Turbolizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Slip on Welded Bow Spring Turbolizer shares the same design, function and operational features with the Hinged Welded Turbolizer. The key difference is that this particular Turbolizer can be directly installed on a pipe by simply slipping it on.

Collars are specially designed with roll formed peripheral ridges that provide extra rigidity. All products undergo a special iron phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

These products are shipped in assembled condition only. They are available in 3 1/2" to 20" sizes. Any special sizes or combination can be made available upon request.

SH07

Rotating Welded Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Rotating Welded Centralizer can be used with a rotating liner in highly deviated well conditions. These Centralizers exert a high restoring force providing optimal stand-off and a low moving force that minimizes drag. Slip-on Centralizers are provided for direct installation on the pipe.

All products exceed API 10D specifications and are made from special double rolled alloy steel fabricated in a Heat Treatment Plant to achieve uniform hardness and excellent spring action. In addition, the rotating Bow Springs are welded to the End Collar under special temperature conditions using extra low hydrogen coated electrodes and this ensures optimal strength and uniformity. The Centralizer allows free rotation of the pipe to ensure maximum displacement efficiency and the Stop Collar ensures secure placement by minimizing moving forces. In addition, the End Collars are specially designed with roll formed peripheral ridges in order to extra rigidity. All Rotating Welded Centralizers undergo a special Iron phosphate coating process to prevent from corrosion then coated with a special polyester powder.

These products are available in assembled condition only. These are available in sizes ranging from 3 1/2" to 20". Any special sizes or combination can be made available upon request.

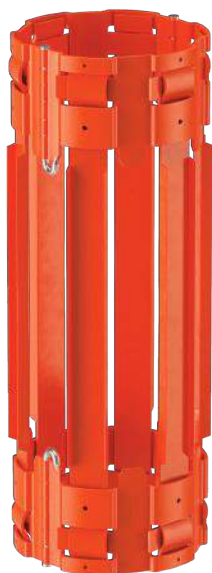


"Bow Spring Centralizer..."

SH08

Hinged Non Welded Positive Bow Centralizer

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Non Welded Positive Bow Centralizers are uniquely designed with a flat bottom "U" profile of different depths. The advantage of these Centralizers is that they significantly reduce frictional drag and perform well in deviated holes.

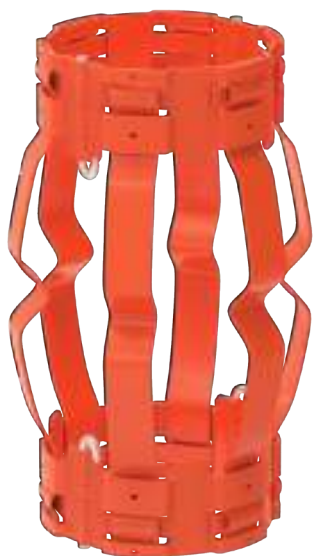
Constructed from high quality steel, the design ensures that almost 100% stand-off is achieved when run inside a cased hole. The product is fabricated so that it is 1/4" or 6 mm less than the inside diameter of the hole size in which the Centralizer is to be run in. This design eliminates weak (brittle) spots passage and the U profile Bow design allows maximum fluid passage. The End Collars are designed with a self-locking action and this makes them fast and easy to assemble whilst having a secure grip. The 10 special U Bows can be configured to any hole diameter and their extended profile prevents them from hitting against casing collars. All Centralizers undergo a special iron phosphate coating process to avoid corrosion and are then coated with a special polyester powder.

These products can be shipped in half assembled condition for economy in shipping and storage costs. They are available in all sizes ranging from 4 1/2" to 20". Any special sizes or combination can be made available upon request.

SH09

Hinged Semi-Rigid Non Welded Bow Spring Centralizer

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Non Weld Semi-Rigid Centralizers combine the features of standard Spring Bow Centralizers and Rigid Centralizers to create a Centralizer that can withstand high lateral loads. Its high restoring force and stand-off together with low running force makes it efficient for deviated and horizontal wells where the load on springs is intense.

The Bow Spring is made of premium quality alloy steel and created in special conditions. The characteristics of double crested profile allow optimal compression to facilitate movement through tight spots and dog-legs. Compared to other Spring Bow Centralizers this device attains a high stand-off because of its high restoring force. It increases contact area for less Bow penetration and facilitates complete mud removal while cementing. Bows can be configured for any hole diameter from a choice of five standard double crested Bows. In addition, these Centralizers undergo a special iron phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

The Centralizers can be shipped in half assembled condition to reduce shipping and storage costs. They are available in 4 1/2" to 20" sizes. Any special sizes or combination can be made available upon request.



"Bow Spring Centralizer..."

SH10

Hinged Semi-Rigid Welded Bow Spring Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Hinged Welded Semi-Rigid Centralizers ensure high efficiency in a variety of casing jobs. The advantage is that Welded Centralizers have more restoring force when compared to Non-Welded Centralizers.

Ultimate strength and uniformity is created by the double crested Bow Springs, which are welded to the End Collar under special temperature conditions using extra low hydrogen coated electrodes. Further stability is provided by the integral hinge that remains intact even when under stress. The End Collars are also designed to give maximum toughness due to a reinforcing rib that is stamped into the End Collar. These Centralizers are available in a combination of Bows configured from a choice of four standard Bow heights for optimal starting and restoring force. All Centralizers undergo a special iron phosphate coating process to protect against corrosion and are then coated with a special polyester powder.

The Centralizers generally shipped in half assembled condition to reduce shipping and storage costs. They are available in all sizes ranging from 3 1/2" to 20". Any special sizes or combination can be made available upon request.

SH11

Slip On Semi Rigid Welded Bow Spring Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Slip On Welded Semi-Rigid Centralizers share many of the same design and operational features as Hinged Welded Centralizers. They can be directly installed onto pipe and are provided with set screw style Stop Collars to increase the holding force.

The Collars are innovatively designed with roll formed peripheral ridges that provide extra rigidity. The Centralizers are available in a variety of Bows configured from a choice of four standard Bow heights. All Centralizers undergo a special iron phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

This product is shipped in assembled condition only. It is available in all sizes ranging from 3 1/2" to 20". Any special sizes or combination can be made available upon request.



"Cement Basket..."

SH15

Slip On Welded Cement Basket

Available in 4 1/2" to 30" sizes + any special sizes



SledgeHammer's Slip On Welded Cement Baskets are designed to run on casing or liners above porous or weak formations that require protection from the hydrostatic pressure generated by the cement column. They can also be used to help support a cement column near the well surface while the cement sets.

SledgeHammer's Hinged Cement Baskets are easy to install around the casing OD. They have convex shaped Bows welded to both End Collars to provide added strength and more adaptability in terms of expansion and contraction. In addition, this type of Cement Basket can be rotated and reciprocated and is available in a choice of welded and non-welded convex shape bows.

1. SH15-H Hinged Welded Cement Basket
2. SH15-NW-H Hinged Non-Welded Cement Basket

SH15-CCB

Canvas Cement Basket

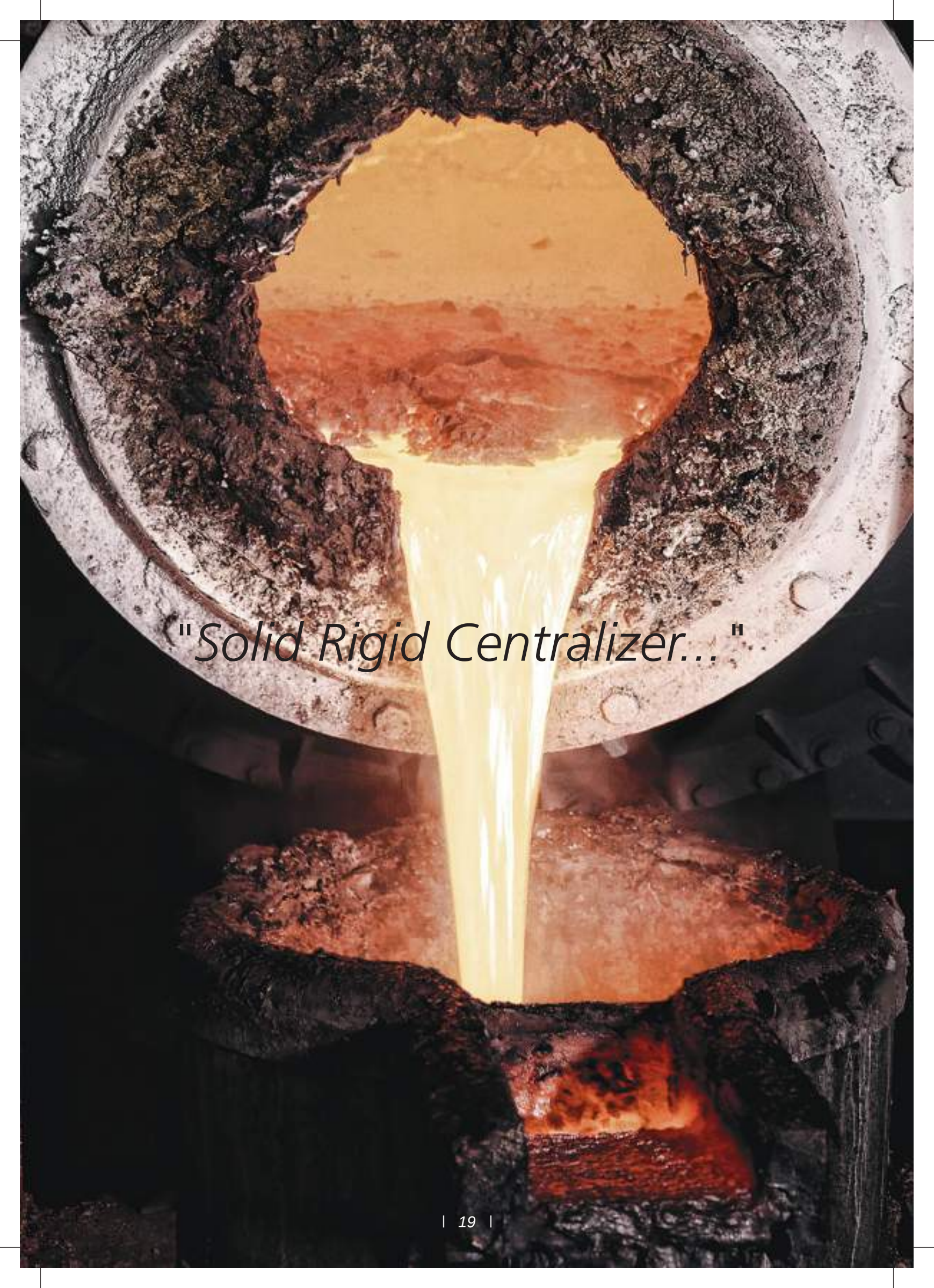
Available in 4 1/2" to 30" sizes + any special sizes



SledgeHammer's Canvas Cement Basket slips on and is made of high strength flexible steel staves and heavy-duty canvas liners. The cement basket aids premature cement hydration helping to reduce hydrostatic fluid column above a loss zone or weak formation. It can be used in most types of well designs and is particularly effective in accommodating larger than nominal hole sizes.

Heavy-duty canvas liners are riveted to staves fabricated onto the high strength steel bows mounted on a steel slip-on end collar. This cement basket is installed between two stop collars. The baskets are not designed to be reciprocated, however, are occasionally allowed to travel the length of a joint to allow for pipe movement.

Sizes are available for all standard casing / hole sizes. Recommended for use with all standard casing grades.

A close-up photograph of a large industrial ladle pouring molten metal. The ladle is made of thick, dark, textured material, possibly refractory or cast iron, with a large circular opening at the top. A bright, glowing stream of molten metal, appearing yellow-orange, flows from the ladle into a mold below. The mold is also made of dark, textured material and is partially filled with the molten metal. The background is dark and industrial.

"Solid Rigid Centralizer..."



"Solid Rigid Centralizer..."

SH12

Slip On Welded Positive Spiralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Slip On Welded Spiralizer was designed for use in highly deviated horizontal wells and with line hangers. The heavy steel construction is very effective compared to other alloys and its construction provides maximum standoff. The Spiralizers can be directly installed on the pipe and are accompanied by Stop Collars positioned by set screws.

This product has boat shaped spiral fins that reduce drag forces while running in pipe thus optimizing mud displacement and minimizing pressure drop. They have resistance to high side loads and are smoothly beveled on both ends to promote a lower coefficient of friction easing casing movement in either direction. The welding of the fins is performed under special conditions with low hydrogen coated electrodes. This ensures optimal strength and uniformity in every weld. In addition, all products under go a special iron phosphate coating process to prevent corrosion and are then coated by a special polyester powder

The products are shipped in assembled condition only. They can be custom made from a choice of seven boat profile depths which cater to any hole diameter, They are available in sizes ranging from 3 1/2" to 20". Any special sizes or combination can be made available upon request.

SH13

Slip On Heavy Duty Welded Positive Spiralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Solid Heavy Duty Spiralizers are specially designed to respond to extra heavy loads in highly deviated horizontal wells and for use with Liner Hangers. The heavy steel construction is highly effective as compared to other alloys. This Spiralizer can be directly installed onto the pipe by slipping it on and is accompanied by compatible Stop Collars beveled from one side positioned by set screws.

This Spiralizer is equipped with hydrodynamic spiral fins that allow optimal mud displacement and minimal pressure drop across the Centralizer. In addition, they are particularly strong with high wear resistance. The wide symmetrical spiral fins are welded to the sleeve under special temperature conditions using extra low hydrogen coated electrodes and this further assures ultimate strength and uniformity in every weld. Resistance to corrosion is provided by a special iron phosphate coating process complemented by a coating of polyester powder.

This product is shipped in assembled condition only. It is available in all sizes ranging from 3 1/2" to 20". Any special sizes or combination can be made available upon request.



"Solid Rigid Centralizer..."

SH14

Slip On Heavy Duty Straight Spiralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Slip On Welded Heavy Duty Spiralizer is designed especially for highly deviated and horizontal wells. They are ideal for use with Liner Hangers. The heavy steel construction is highly effective and provides superior toughness over other materials.

Wide symmetrical straight fins are welded to the one piece of rolled formed sleeve under required temperature and conditions using low hydrogen coated electrodes. This ensures ultimate strength and uniformity in every weld. The fins are designed to provide low coefficient of friction to reduce drag forces while running the pipe. They create a vortex flow to optimize mud displacement and minimize pressure drop across the Centralizer. Vanes can be selected to meet any hole diameter from a choice of seven boat profile depths. All products receive a special phosphate coating to prevent corrosion and are then treated with a special polyester powder.

This product is shipped in assembled condition only. It is available in all sizes ranging from 3 1/2" to 20". Any special sizes or combination can be made available upon request.

SOB02

Slip on Stand off Band

Available in 3 1/2" to 20" sizes



SledgeHammer's Slip On Standoff Band is designed to provide a positive stand off of the casing. It can be used in both cased and open holes and is required in situations where close tolerance between the casing and hole is being encountered. It is particularly effective for liner applications.

The angled fins provide increased turbulent flow and further torque can be achieved by installing the band between a set screw Stop Collar (SC04). The product is treated against corrosion using a special phosphate coating followed by polyester coating.

Slip on Standoff Bands are available in all sizes ranging from 3 1/2" to 20". Any special sizes or combination can be made available upon request.



"Solid Rigid Centralizer..."

DSW03

Welded Spiral Vane Solid Rigid Centralizer Fixed

Available in 2 7/8" to 30 " sizes + any special sizes



SledgeHammer's Welded Spiral Vane Solid Rigid Centralizer Fixed is similar to a Welded Spiral Vane Solid Rigid Centralizer except it has rows of set screws on the outer periphery of the Centralizer in order to restrict rotation. It can be easily converted from fixed to non-fixed design by detaching set screws and positioning with Stop Collars. All Centralizers are pre-treated and are painted or coated with polyester powder.

DAV02

Straight Vane Aluminum Rigid Centralizer

Available in 3 1/2" to 20 " sizes + any special sizes



SledgeHammer's Straight Vane Aluminum Rigid Centralizer is suitable for either cased or open holes. It performs well in several situations including primary cementing jobs and for deviated and horizontal wells, liner overlaps and shoe joints. It is made from high tensile cast aluminum that has proven effective in responding to shock, impacts and corrosion.

The vane ends are angled at 30 degrees relative to the casing centerline reducing drag and assists the casing in reaching total depth (TD). The wide vanes distribute load from the casing string into the wellbore without gouging. This product is fabricated in a softer material than wellhead equipment to avoid damage to the wellhead when running through. It has provided excellent results in extended reach and horizontal applications.

Any special sizes or custom combination can be made available upon request.



"Solid Rigid Centralizer..."

DAV03

Straight Vane Aluminum Rigid Centralizer Fixed

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Straight Vane Aluminum Rigid Centralizer Fixed is suitable for either cased or open holes. It performs well in primary cementing jobs and for deviated and horizontal wells, liner overlaps and shoe joints. It is made from high tensile cast aluminum that has proven effective in responding to shock, impacts and corrosion.

The vane ends, which are angled at 30 degrees, reduce drag and assist the casing in reaching total depth (TD). Another feature is that the wide vanes distribute load from the casing string into the wellbore without gouging. This product is made in softer material than wellhead equipment to avoid damage to the wellhead.

This product differs to DAVO2 in that there are set screws between the vanes. If rotation is required then the product can be installed without set screws and positioned between the Stop Collars, or between the Stop Collar and the Casing Collar. If rotation is not required then the screws can be tightened up as illustrated in the picture.

Any special sizes or custom combination can be made available upon request.

DAS02

Aluminum Spiral Vane Solid Rigid Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Aluminum Spiral Solid Centralizers were developed in response to the need for better cementing in deviated and horizontal wells.

The unique design ensures optimal flow area and is strong and resistant to impact. These Centralizers are also able to withstand high well bore temperature while providing maximum horizontal standoff.

The fins or blades overlap the entire 360-degree open hole circumference and the reduced flow area between the spirals provides and creates a vortex motion that increases fluid velocity. Another benefit is that the extra length of the fins gives maximum centralization, high stand off and increases annular turbulence while the angle further enhances turbulence and removal of debris from around the casing. Even without rotation, the angled fins still induce turbulent flow for improved cutting and filter cake removal. All Centralizers are stove painted or coated with polyester powder.

These Centralizers are available in all sizes ranging from 3 1/2" to 20". Any special sizes can be made available upon request.



"Solid Rigid Centralizer..."

DAS03

Aluminum Spiral Vane Rigid Centralizer Fixed

Available in 3 1/2" to 20 " sizes + any special sizes



SledgeHammer's Aluminum Spiral Vane rigid Centralizer Fixed shares all the same features as the Straight Aluminum Rigid, with the difference being the spiral vanes. The "DAS03" is made of high tensile cast aluminum for shock, impact, and corrosion resistance. This Centralizer provides positive standoff between casing and wellbore and is made of softer material than wellhead equipment to avoid damage to the wellhead.

The unique spiral vanes overlap the entire 360-degree open hole circumference. The reduced flow area between these vanes provides a vortex motion that promotes increased fluid velocity. If rotation is required, the Centralizer can be assembled without set screws and positioned between Stop Collars, or between the Stop Collar and the Casing Collar. If rotation is not required then the screws can be tightened as illustrated in the picture. This product is available with left-hand or right-hand vanes in a variety of sizes.

These Centralizers are available in all sizes ranging from 3 1/2" to 20". Any special sizes can be made available upon request.

DSS02

Steel Spiral Vane Solid Rigid Centralizer

Available in 3 1/2" to 20 " sizes + any special sizes



SledgeHammer's Steel Spiral Vane Solid Rigid Centralizers are constructed of one-piece of high strength corrosion resistance steel. These Centralizers are available in custom made lengths as requested by the customer. The quality is excellent as they are constructed from high graded castings followed by surface finishing on a CNC Lathe. In addition all Centralizers are liquid stove painted or coated with polyester powder. Rigid quality control and inspection ensure consistently high standards with excellent results.

These Centralizers may be ordered in a selection of different lengths on request.



"Solid Rigid Centralizer..."

DZS02

Zinc Spiral Vane Solid Rigid Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Zinc Spiral Vane Solid Rigid Centralizers are particularly effective in deviated and horizontal wells ensuring optimal flow.

Optimal flow is achieved due to the reduced flow area between the spiral blades. This generates a vortex effect, which in turn increases fluid velocity. In addition, the 30-degree angle of the vane reduces drag, and the gentle flow from the body to the height of the vane eliminates scraping or dragging into the formation. The product is shock resistant and exhibits high tensile and yield strength. Fabricated from high quality zinc, it is also resistant to corrosion.

This Centralizer is available in 3 1/2" to 20" sizes. Any special sizes can be made upon request.

DSR02

Steel Twin Blade Rotating Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Steel Twin Blade Rotating Centralizers have a unique design for special purposes and are fabricated from one piece of high strength steel.

The design is ideal for running casing into unusually irregular well bores. In addition, it is particularly effective for guiding the casing and providing maximum flexibility for the casing string. The 45 degree angled fins create a radial swirling fluid motion when the fluid is being pumped. This motion assists in channeling, removing mud and cement placement. Other key features of this product include its excellent circumference standoff from the wellbore and the tapered vanes that significantly decrease drag. This Centralizer is not fixed to the casing. Instead, it rotates up and down by use of the Stop Collar and beneficially reduces torque. This product is very strong and durable and is stove painted or coated with polyester powder.

Steel Twin Blade Rotating Centralizers are available in all sizes ranging from 3 1/2" to 20". Any special sizes can be made upon request.



"Solid Rigid Centralizer..."

DPS02

Thermoplastic Spiral Vane Solid Rigid Centralizer

Available in 3 1/2" to 20 " sizes + any special sizes



SledgeHammer's Thermoplastic Spiral Vane Solid Rigid Centralizers are designed to reduce drag and friction. Key advantages include reduction in friction, ultimate drag and rotational torque together with increased abrasion resistance for maximum stand off. These Thermoplastic Centralizers are constructed from one-piece of superior quality polymer and have excellent tensile and yield strength.

Designed to provide optimal flow, the fins overlap the entire 360-degree open hole circumference. The result of this is significant reduction in flow area between the spiral vanes that generates a vortex motion and increases fluid velocity. In addition, the extended length of the fins gives maximum centralization, high stand off and increases annular turbulence. Even without rotation, the angled fins induce turbulent flow for improved cuttings and filter cake removal. These Thermoplastic Centralizers withstand high well bore temperatures of up to 230 degrees Celsius while providing maximum horizontal stand off.

This product is available in standard length only. Each Centralizer is surface finished on a CNC lathe and is rigorously checked for quality. They are available in all sizes ranging from 3 1/2" to 20" for any hole combination.

DAR02

Aluminum Rotating Spiral Vane Centralizer

Available in 3 1/2" to 20 " sizes + any special sizes



SledgeHammer's Aluminium Rotating Spiral Vane Solid Centralizers are special purpose designed for running casing into unusually irregular well bores, for guiding the casing and providing the maximum flexibility for the casing string.

These Centralizers have tapered vanes that considerably reduce drag during running into the casing or well bore. The angle of the vanes creates a radial fluid motion when the fluid is pumped. This motion reduces channeling and provides enhanced clean up and cement placement properties. These Centralizers are not fixed to the casing, instead they rotate up and down by the use of a Stop Collar and significantly reduce the torque necessary to rotate the casing. All Centralizers are painted or coated with polyester powder.

These products are available in all sizes ranging from 3 1/2" to 20" for any hole combination. Any special sizes can be made upon request.



"Solid Rigid Centralizer..."

DZRD01

Low Torque Roller Centralizer

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Low Torque Roller Centralizers are specially designed to run in deviated or horizontal sections and are effective in reducing friction.

When casing equipped with Roller Centralizer runs into a deviated or horizontal hole, the sliding friction between the casing and the borehole is converted into rolling friction. When running cases, irregular hole diameters can lead to the wall of the borehole having an impact force on the spiral centralizer. The use of rollers significantly reduces this impact. Torque reduction is provided by vertical alignment of rollers on the periphery of roller centralizer. In addition, the outside diameter of the roller is kept slightly larger than the outside diameter of the fins' envelope.

These products are available in sizes ranging from 3 1/2" to 20".

DZRD02

Low Drag Roller Centralizer

Available in 4 1/2" - 13 3/8" sizes + any special sizes



SledgeHammer's Low Drag Roller Centralizer is a complete mechanical friction-reduction solution designed for extended-reach wells. It reduces torque, drag, casing wear, tool-joint wear and differential sticking while also improving directional control, ROP and hole cleaning.

In Low Drag Roller Centralizers all rollers are arranged in horizontal direction. This arrangement is effective in significantly reducing the dragging force. This means that the liner can be rotated and passed through anticipated ledges, tight spots, shale formation and doglegs.

This product is available in 4 1/2" - 13 3/8" sizes. Any special sizes can be made upon request.



"Cable Support Coupling..."

SH68-NFC

Non Ferrous Centralizer With Cable Support

Available in 3 1/2" to 20 " sizes + any special sizes



The SledgeHammer's Non Ferrous Tubing Centralizer is a tubing case centralizer which is not only used to centralize (keep standoff) the casing but also to provide protection to down hole casing cables. As down hole cables are more likely to get damaged due to crushing between the production tubing couplings and the casing internal diameter, cost the industry millions of pounds in unscheduled work overs and recompletions. But today cable damage seems to be virtually unheard of because of the presence of products like mid-joint protectors, Control line protector, and ESP Clamps etc.

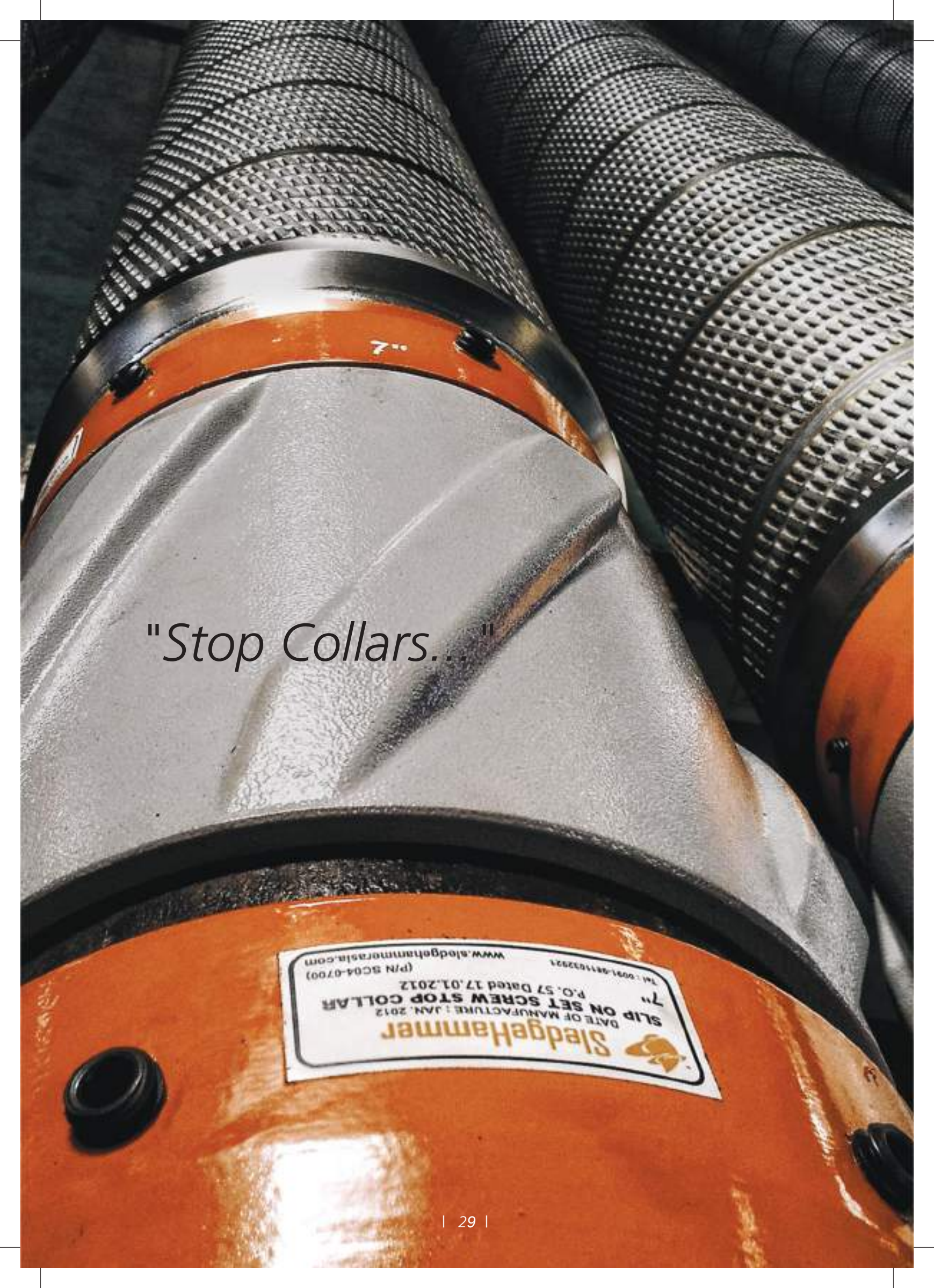
SH68-CC

Cross Coupling With Cable Support

Available in 3 1/2" to 20 " sizes + any special sizes



It does have a significant role to protect casing cables, to avoid it from bending, crushing and hostile environments affect. The cable protector has been introduced throughout the world's oil and gas producing regions and from its humble beginnings in the North Sea is now protecting down hole cables from mechanical damage in thousands of oil and gas wells on land and sea throughout the world.

A close-up photograph of a Sledgehammer 7 inch Stop Collar installed on a metal pipe. The collar is orange and features a white label with the brand name 'Sledgehammer' and technical specifications. The pipe has a textured, metallic surface. The text '7"' is visible on the collar's band.

"Stop Collars..."





"Stop Collars..."

SC01

Hinged Spiral Nail Stop Collar

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Hinged Spiral Nail Stop Collar utilizes two spiral-locking pins that are driven in securely to lock the Collar into position around the casing. The advantage of this type of Collar is that it can be latched onto the casing pipe without having to be slipped on at the end of the casing. This ensures rapid and easy installation

These Collars are particularly effective as they provide maximum annular clearance. All Stop Collars undergo a special phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

These are available in all sizes ranging from 4 1/2" to 20". Any special sizes can be made upon request

SC02

Hinged Bolted Stop Collar

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Hinged Bolted Stop Collars can be easily latched onto the casing pipe to keep Centralizers and attachments in place.

This design features a draw-bolt to force the Stop Collar to grip the casing. The Collar consists of two pieces that are hinged at one end. On the other end, a single bolt is used to tighten the Collar to the casing. On locking it can be tightened for a holding force up to 10 times more than the Centralizers starting force as per API 10D. All Stop Collars undergo a special iron phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

This product is available in all sizes ranging from 4 1/2" to 20". Any special sizes can be made upon request



"Stop Collars..."

SC03

Hinged Set Screw Stop Collar

Available in 4 1/2" to 20 " sizes + any special sizes



Sledgehammer's Hinged Set screw Stop Collars can be latched onto the casing pipe without having to be slipped on and are easy to install. They are particularly effective when low annular clearance is encountered.

This particular design consists of two parts that are hinged at 180 degrees. The gripping force is created by one set of set screws which tighten the Collar to the casing firmly. All Stop Collars undergo a special iron phosphate coating process to prevent corrosion, and are then coated with a special polyester powder.

This product is available in all sizes ranging from 4 1/2 " to 20 ". Any special sizes can be made upon request

SC04

Slip on Set Screw Stop Collar

Available in 4 1/2" to 20 " sizes + any special sizes



Sledgehammer's Slip on Set Screw Stop Collars is single piece Collar that uses one row of set screws to induce the gripping force. It is used where high axial loads are expected, and is effective where low annular clearance is encountered.

This Stop Collar is easy to install because it simply slides onto the casing. These Stop Collars undergo a special phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

The product is available in all sizes ranging from 4 1/2 " to 20 ".



"Stop Collars..."

SC05

Slip on Set Screw Stainless Steel Stop Collar

Available in 4 1/2" to 20 " sizes + any special sizes



SledgeHammer's Slip on Set Screw Stop Collar is single piece collar that uses one row of set screws to induce the gripping force. It is used where high axial loads are expected, and is effective where low annular clearance is encountered.

This Stop Collar is easy to install because it simply slides onto the casing. These Stop Collars undergo a special phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

The product is available in all sizes ranging from 4 1/2 " to 20 " .

SC06

Slip on Set Screw Ductile Iron Stop Collar

Available in 4 1/2" to 20 " sizes + any special sizes



SledgeHammer's Slip on Set Screw Ductile Iron Stop Collar is a single piece collar. Set screws on the outer periphery of the Stop Collar fix it securely onto the casing. It is easy to install because it can be directly fixed onto the pipe. It is made of ductile iron and as a result exhibits good impact and fatigue capability. It is used where high axial loads are expected. It also works well in installations of different cement baskets and different type of Centralizers. These stop collars undergo a special phosphate coating process to prevent corrosion and are then coated with a special polyester powder.

This product is available for all standard casing sizes ranging from 4 1/2 " to 20 " . Any special size can be made upon request.

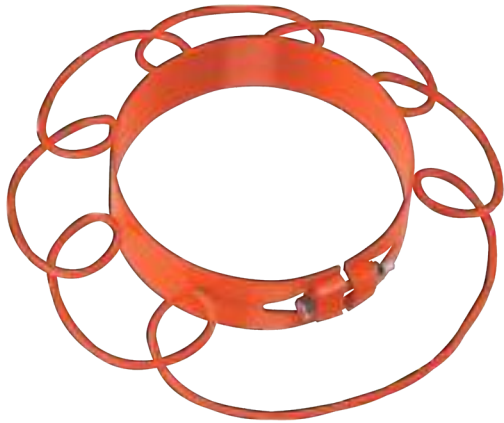


"Stop Collars..."

SC07

Cable Wall Cleaner

Available in 4 1/2" to 20 " sizes + any special sizes



The Reciprocating Cable Wall Cleaner is a Slip-on Cleaner with an integral locking device. It helps remove excess wall cake, gelled mud, and bit cuttings from the wellbore. This provides better bonding surfaces for the cement by producing a wiping action during running and reciprocation.

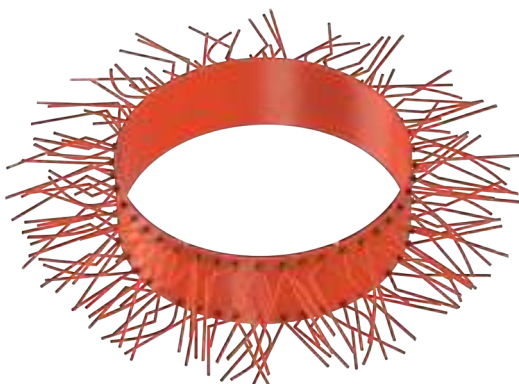
The Cable Wall Cleaner is locked onto the casing. The bolt holds the wipers in position and eliminates the need for a Stop Collar. In addition, the positive holding action does not damage the casing. Overlapping high-alloy steel cables are interlaced a full 360 degrees around the band. The Cable Wall Cleaner is locked onto the casing and does not require the use of Stop Collars. The Cable Wall Cleaner is also available in solid end band styles and in a hinged design for use on upset casing and tubing.

This product is available in sizes of 4 1/2 " through 20 ". Any special size can be made upon request.

SC08

Wire Scratcher

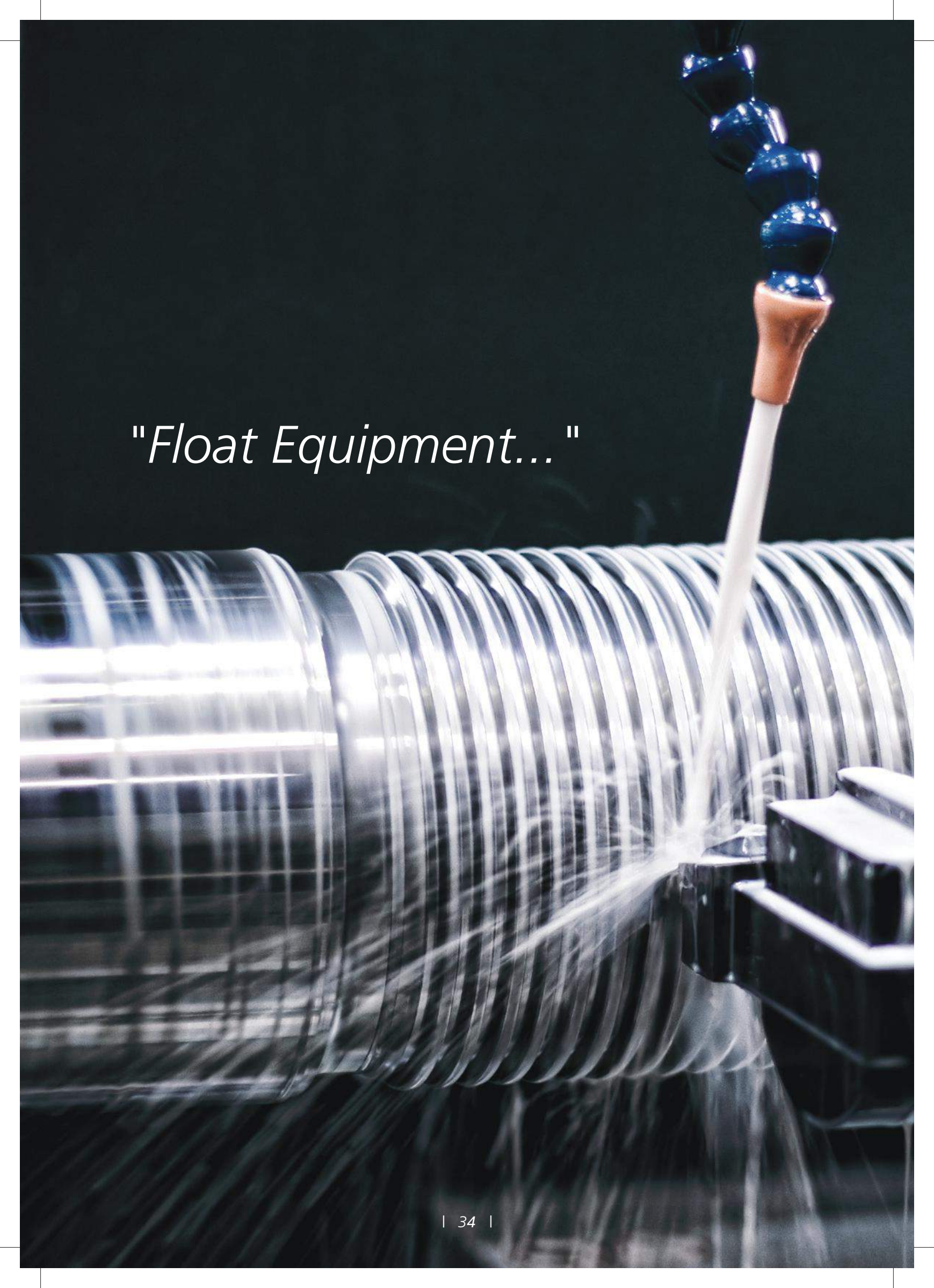
Available in 4 1/2" to 20 " sizes + any special sizes



SledgeHammer's Wire Scratcher helps remove excess wall cake, gelled mud, and bit cuttings from the wellbore, and also serve as reinforcement in the cement column. In addition, it adds localized turbulence during cementing operations and assists in the bonding of cement between the casing and porous formations.

The Scratcher consists of a hinged collar with wire bristles attached to it. These bristles are hardened and tempered. Hinge pins secure the collars around the casing securely.

Sizes are available for all standard casing sizes. Any special size can be made available on request.



"Float Equipment..."



"Float Equipment..."

SH18-RS

Reamer Shoe Single/Double Valve

Available in 4 1/2" to 30 " sizes + any special sizes



SledgeHammer's Reamer Shoe is designed with a blade cutting structure and diamond shaped face that ensures safe passage of casing and liners thus facilitating rotating and reciprocating applications. It effectively negotiates around ledges, swelling shale, mud cake build-up on porous formations, or sand bridges occurring in the wellbore. The nature of the problem determines which style of shoe is most appropriate.

This product is available in 4 1/2" to 30 " sizes and in any special sizes on request.

SH20

Guide Shoe

Available in 3 1/2" to 20 " sizes + any special sizes



SledgeHammer's Guide Shoe offers a simple and economical means to run casing into the well bore. The Guide Shoe guides the casing towards the centre of the hole and reduces problems associated with hitting rock ledges therefore reducing chances of sidewall cave-in.

The design contains an internal taper on the bottom to ensure trouble-free entry of drilling tools back into the casing string after drill out and during drilling operation. Eccentric cement noses can also be provided for applications where sloughing and highly deviated well bores are encountered. All the internal components are fully PDC drillable.

SledgeHammer's Guide Shoes are available with Butt-Welded, Slip On and Threaded end. The product is available in 3 1/2" to 30 " sizes any special sizes can be provided on request.



"Float Equipment..."

SH18-FS

Float Shoe Single/Double Valve

Available in 3 1/2" to 20 " sizes + any special sizes



SledgeHammer's Float Shoe is made from seamless casing grade steel and the design ensures positive sealing in vertical, horizontal and deviated wells.

Float equipment can be supplied in all grades of steel such as K-55, L-80, N-80, C-95, T-95, and P110. Traceability of component material starts from the mill material certificates; all machining of Shoes is processed on CNC machines. SledgeHammer's Float equipment is tested and rated in compliance with API required specs. The Shoe is equipped with a plunger valve that is fabricated from high polymer plastic, natural rubber together with a coating of phenolic substance. The valve is encased and held in place by the high-pressure cement mixture. The design and manufacturing process of the valve allow for maximum circulation rates.

This product is available in 3 1/2" to 30 " sizes and custom sizes can be made on request.

SH19

Float Collar Single/Double Valve

Available in 3 1/2" to 20 " sizes + any special sizes



SledgeHammer's Float Collar is made from seamless casing grade steel and supplied with a plunger valve that is non-metallic. The Collar is used to prevent flowback of cement slurry when pumping stops.

This design is particularly suited to vertical, horizontal and deviational wells. The material used is high quality seamless casing grade steel. Traceability of the component material starts from the mill material certificates and collars are processed on CNC machines. In addition, SledgeHammer's Float equipment is tested and rated in compliance with API RP 10F specs. The material used in the valves

This product can be ordered in single or double valve configuration and is PDC drillable. It is available in 3 1/2" to 30 " sizes and any special sizes can be custom made on request.



"Differential Fill up..."

SH18-DF

Differential Fill-up Float Shoe

Available in 5 1/2" to 20 " sizes + any special sizes



SledgeHammer's Differential Fill-Up Float Shoe is equipped with a differential valve. This controls the differential filling of the casing during the running operation. The greater the differential pressure across the valve, the larger the control port in the diaphragm opens to allow fluid to enter the casing.

This type of filling action reduces running time of casing and reduces surge pressure on formations.

This product is available in 5 1/2" to 20 " sizes and any special sizes can be provided upon request.

SH19-DF

Differential Fill-up Float Collar

Available in 5 1/2" to 20 " sizes + any special sizes



SledgeHammer's Differential Fill-Up Float Collar is provided with a differential valve. This design maintains constant differential pressure between inside and outside the casing because of entry of fluid through the bottom of the casing.

A weighted ball is dropped from the surface that converts this valve into a one-way cementing valve that allows cement to fill up into the annulus. This design is such that fluid is prevented from re-entering the casing. This type of filling action reduces running time of casing and reduces surge pressure on formations.

This product is available in 5 1/2" to 20 " sizes and any special sizes can be provided upon request.



"Auto Fill Up..."

SH18 AF

Auto Fill-up Float Shoe Conventional/non rotating

Available in 5 1/2" to 20 " sizes + any special sizes



SledgeHammer's Auto Fill-Up Float Shoe permits the casing to fill automatically while being run into the hole. The valve is always in the open position, allowing maximum filling of the casing as it is running in the well bore. This is especially effective on liner jobs and sensitive hole conditions. Auto Fill-up Float Shoes can be provided in conventional as well as with non-rotating profile.

This product is available in 5 1/2" to 20 " sizes and any special sizes can be customized on request.

SH19 AF

Auto Fill-up Float Collar Conventional/non rotating

Available in 5 1/2" to 20 " sizes + any special sizes



SledgeHammer's Auto Fill-Up Float Collar is especially effective on liner jobs and sensitive hole conditions. It permits the casing to fill automatically while being run into the hole. The valve is always in the open position, allowing maximum filling of the casing as it is running in the well bore.

Auto Fill-up Float Shoes can be provided in conventional as well as with non-rotating profile. The product is available in 5 1/2" to 20 " sizes and any special sizes.



"Float Equipment..."

SH18-SI/SIL

Stab-in Float Shoe w/o Latch in Profile

Available in 9 5/8" to 36 " sizes + any special sizes



SledgeHammer's Stab-in Float Shoes are provided with stab-in profile for stab-in cementing where the drill pipe is stabbed directly into the float shoe. This type of shoe is used for inner string cementing operations.

It is available with single valve as well as with double valve. The product is available in 9 5/8" to 36 " sizes and any special sizes on request.

SH19-SI/SIL

Stab-in Float Collar w/o Latch in Profile

Available in 9 5/8" to 36 " sizes + any special sizes



SledgeHammer's Stab-in Float Collars are designed for cementing large diameter casing through casing or drill pipe. With stab-in cementing, the drill pipe is stabbed directly into the Float Collar. It improves displacement accuracy, and reduces cement volume and net rig time.

The Stab-In Latch Profile Float Collar is provided with latch profile for drill-pipe wiper plug.

This collar is available in 9 5/8 to 36" sizes and is available with single valve as well as with double valve. Any special sizes can be made upon request.



"Float Equipment..."

SH18-UJ/SJ/DJ

Up Jet / Side Jet / Down Jet Float Shoe

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Up Jet / Side Jet / Down Jet shoes are provided with drilled angled holes which ensure even distribution of fluid with added assurance that circulation of fluid is not interrupted when casing becomes plugged during running or is rested on bottom. Enhancement of fluid turbulence helps in preventing channeling near the shoe thus aiding in hole cleaning. These Float Shoes are available with single valve as well as with double valve, and in conventional and non-rotating profile.

SH19-UJ/SJ/DJ

Up Jet / Side Jet / Down Jet Float Collar

Available in 3 1/2" to 20" sizes + any special sizes



SledgeHammer's Up Jet / Side Jet / Down Jet Float Collars are made with drilled angled holes which ensure even distribution of fluid with the added assurance that the circulation of fluid is not interrupted when casing becomes plugged during running or alternatively rested on bottom. Enhancement of fluid turbulence helps in preventing channeling near the shoe thus aiding in hole cleaning.

Float Collars are available with single valve as well as with double valve. The products can also be supplied with a non-rotating profile for using with cementing plugs that have a non-rotating profile.

These products are available in 3 1/2" to 20" sizes. Any special sizes can be made upon request.



"Stage Cementing Tools..."

SH30

Mechanical Stage Cementing Tools

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Mechanical Stage Cementing Tool allows cementing of casing string in two stages. These tools set the standard for reliability, cost effectiveness, and ease of use with outstanding built-in features and quality. They are the tools of choice when drilling requirements call for proven technology and low risk.

The compact, simple design minimizes the number of moving parts and makes the tools easy to handle. The tool's clear opening and closing indications at the surface accommodate the hydraulic conditions of the well for safer, more efficient operations. The internal sleeves increase reliability and prevent premature opening from formation restrictions on applied pressures. It reduces total pumping pressure in long casing strings.

These tools are available in all sizes ranging from 4 1/2" to 20". Any special sizes can be made upon request.

SH32

Hydraulic Stage Cementing Tools

Available in 4 1/2" to 20" sizes + any special sizes



SledgeHammer's Hydraulic Stage Cementing Tool is durable and reliable and meets the challenges of cementing holes at any angle with a hydraulically opened port system. Designed specifically for horizontal completion this cementing tool can be placed anywhere in the casing string.

It is specifically used for primary cementing in deep vertical or high deviated horizontal-well conditions. In addition it can be used to reduce hydrostatic pressure on weak formations to prevent lost circulation during cementing. A clear advantage is the surface indications of opening and closing pressures that provide safer and more efficient operations. In addition, its functionality is independent of hole angle or mud properties and the pressure of the tool can be adjusted at rig site to meet well requirements, providing operational flexibility.

These tools are available in all sizes ranging from 4 1/2" to 20". Any special sizes can be made upon request.



"Landing Collar..."

SH52

Hydraulic Landing Collar

Available in 4 1/2" to 7 5/8" sizes



Sledgehammer's Hydraulic landing Collar has several features to help simplify or accelerate drillout thus saving time.

The Landing Collars assemblies and plugs latch in place and have anti-rotational profiles that are compatible with PDC drill bits to provide operational flexibility. The threaded aluminum tube is cemented in the body, minimizing aluminum content.

Threads and metallurgies are available as required.

SH52

Hydraulic Landing Collar

Available in 4 1/2" to 7 5/8" sizes



The system's accessory components can be installed in the field. Several features help simplify or accelerate drillout, saving rig time: All plugs latch in place and have antirotation profiles. The SledgeHammer Landing Collar's assemblies and plugs are compatible with PDC drillbits to provide operational flexibility. The threaded aluminum tube is cemented in the body, minimizing aluminum content. Threads and metallurgies are available, as required.



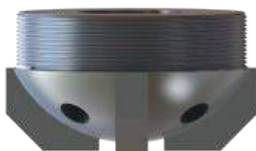
SH18-BN/EC

Bullet Nose / Eccentric Nose Float Shoe

Available in 3 1/2" to 30 " sizes + any special sizes



Bullet Nose



Spade Nose



Eccentric Nose

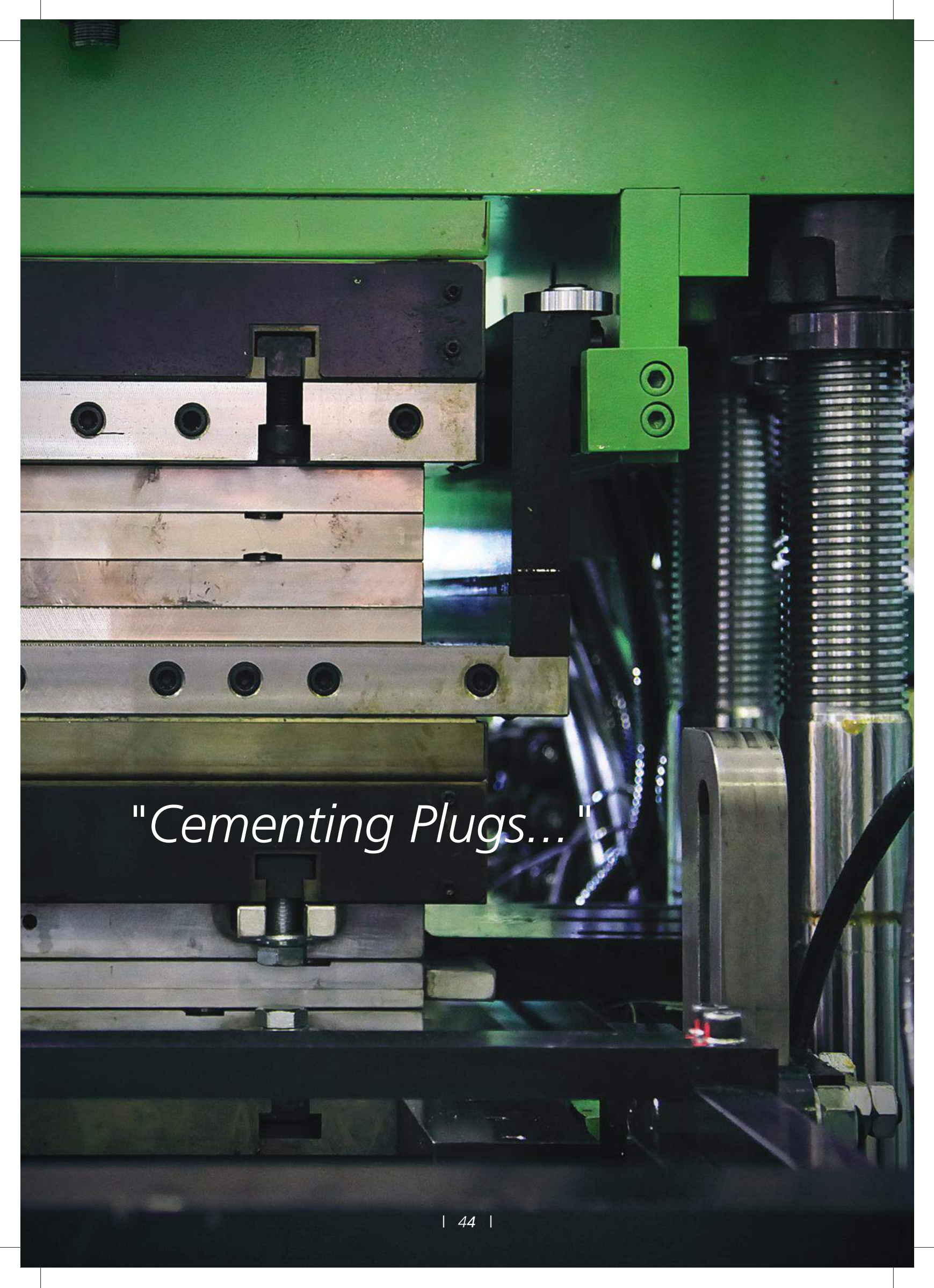
For different well conditions, SledgeHammer offer a variety of Noses assembled with different kind of Float Shoes such as Conventional, Non Rotating, Auto Fill Up, Stab-in, Differential Fill up etc.

These Noses are available in different material such as Cement, Polyamide Plastic and Aluminium.

The different conditions of well determine which kind of Shoe/Nose is used.



Eccentric Alluminium Nose Float Shoe



"Cementing Plugs..."



"Cementing Plug..."

SH16

Cementing Plug Rotating

Available in 3 1/2" to 30" sizes + any special sizes



SledgeHammer's Rotating Cementing Plugs are manufactured using graded rubber that is fused onto a composite or aluminum core.

The top plug can be used when a dual plug system is not required and the bottom cementing plug can be used when a dual plug system is required. All plugs are completely PDC drillable, and the operating range of temperature possible with an Aluminum core is up to 200 degrees Fahrenheit.



This product can also be ordered for use in higher operating temperatures and use with either synthetic or mud fluids. It is available in 3 1/2" to 30" sizes. Any special sizes can be made upon request.

SH26

Cementing Plug Non Rotating

Available in 3 1/2" to 30" sizes + any special sizes



SledgeHammer's Non-Rotating Top & Bottom Cementing Plug is designed to decrease drill out time.

A feature of these particular cementing plugs is the reinforced locking teeth that are built into the plugs. These lock together between the plugs and the float equipment to eliminate rotation of the plug during drill out. The plugs are made of high quality graded rubber with a plastic core inside. No metal parts are used and the plugs are completely PDC drillable.



This product is available in 3 1/3" to 30" sizes. Any special sizes can be made upon request.

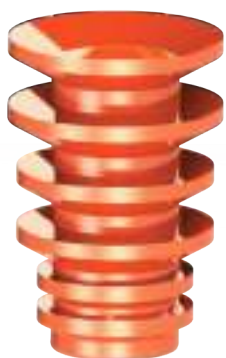


"Cementing Plug..."

SH27

Combination Cementing Plug

Available in 3 1/2" to 30" sizes + any special sizes



SledgeHammer's Combination Cementing Plugs are manufactured for use in combination casing strings where two or more different casing or tubing strings must be wiped by the cementing plugs during the displacement of fluids.

They are provided with different sizes of rubber fins which help in wiping the casing walls as well as assisting in displacing the cement in one step. The plugs are made of graded rubber and are completely PDC drillable.

Combination Cementing Plugs are available in 3 1/2" to 30" sizes. Any special sizes can be made upon request.

SH16 AL

Conventional Aluminium Insert Cementing Plug

Available in 16" to 30" sizes + any special sizes



SledgeHammer's Conventional Aluminum Insert Cementing Plugs are manufactured from graded rubber fused onto a core of Aluminum. Three self-centering cups with wiping elements are bolted onto the Aluminum core.

Differential pressure across the plug forces both wipers and cups firmly against the casing wall to create a firm wiping action throughout the length of the casing string. The all-aluminum core resists distortion from pressure in a deep well and gives support to long columns. The top plug can be used when a dual plug system is not required. All plugs are PDC drillable and the operating range of temperature for the aluminum core is up to 200 degrees Fahrenheit.

This product is available in 16" to 30" sizes. Plugs can be ordered for higher operating temperatures and operation in either synthetic or mud fluids on request.



"Cementing Head..."

SH62-SP

Cementing Head Single Plug Head

Available in 4 1/2" to 20 " sizes + any special sizes



SH Cementing Head is designed to hold a cementing plug before it is pumped down the casing during the cementing operation. In most operations, a bottom plug is launched before the spacer or cement slurry. The top plug is released from the cement head after the spacer fluid. A manifold incorporated into the cement head assembly allows connection of a fluid circulation line. SH manufacture both type of Cementing Head,

SH62-DP

Cementing Head Double Plug Head

Available in 4 1/2" to 20 " sizes + any special sizes



SH Cementing Head is designed to hold a cementing plug before it is pumped down the casing during the cementing operation. In most operations, a bottom plug is launched before the spacer or cement slurry. The top plug is released from the cement head after the spacer fluid. A manifold incorporated into the cement head assembly allows connection of a fluid circulation line. SH manufacture both type of Cementing Head,



"Cross Coupling/Centralizer Sub..."

SH41

Bridge Plug/ Cement Retainer

Available in 4 1/2" to 20 " sizes + any special sizes



Sledgehammer oil tools developed the bridge plug and cement retainer with their accessories. This tool is used for isolation of wellbore. There are the two types, either it will be permanent type or retrievable type. Sledgehammer has permanent type right now. It may be set by mechanically or hydraulically. This tool is easily convertible in bridge plug to cement retainer and vice versa. Cement retainer is used for secondary cementing operation too.

SH47

Wireline Adapter Kit

Available as per Bridge Plug/Cement Retainer



The Model SH47 Wire line Adapter Kit is used to couple an electric line or hydraulic setting, tool assembly to the Bridge Plug/ Cement Retainer.



"Cement Retainer/Bridge Plug..."

SH42

Snap Latch Stinger Sub

Available as per Bridge Plug/Cement Retainer



SLEDGEHAMMER Stinger Assembly is a tubing conveyed latching seal assembly that is used to operate the sliding valve in a wire line set WLCR Cement Retainer. SLEDGEHAMMER Stringer Assembly may be run with a Tubing Centralizer or a modified 'star guide' to provide a centralized entry into the cement retainer. The Snap-In and Snap-Out collet serves as an indicator. Providing positive control when the work string is picked up to close the slide valve. The snap out indicator re-engages each time the work string is lowered to open the valve. The snap out indicator helps prevent the seal from pumping out during pumping operations or tubing testing. The snap out indicator may be removed from the cement retainer by straight pull or by rotation serving additional safety feature.

SH85

Snap Latch Control Unit

Available as per Bridge Plug/Cement Retainer



It's use for Cement Retainer. The Model SH85 Control Unit is made up above the stinger sub and provides a centering mechanism for entering in the cement retainer bore.



"Cement Retainer/Bridge Plug..."

SH53

Hydraulic Setting Tool

Available in S10 / S20 sizes



SLEDGEHAMMER Hydraulic Setting tools translates hydraulic pressure applied to the tubing to a force transmitted through the wire line adapter kit to the seal bore packer, plug, or cement retainer to fully set the slips and pack-off the rubber element. SLEDGEHAMMER Hydraulic Setting tool and wire line adapter kit are assembled to a packer bridge plug, or cement retainer that is commonly set with a wire line deployed pressure setting tool. Use of SLEDGEHAMMER Hydraulic setting tool is particularly well suited for installation of packer, plug or retainers in highly deviated or horizontal well bores where wire line operations are impractical.

SH29

Cross Over

Available in 4 1/2" to 20 " sizes + any special sizes



A crossover is a one piece tubular section used for the purpose of joining or changing from one size, weight, or type of thread connection to the same or another size, weight, or type of thread connection.



API Modified High Pressure Thread Compound

SH LUB-A

API Modified High Pressure Thread Compound



SledgeHammer's API Modified High Pressure Thread Compound is specially formulated for use on casing, tubing, line pipe, flow lines, subsurface production tools, and tank batteries. It lubricates, seals and protects the threaded connections of oilfield tubular goods on makeup, in service, and in storage. It is highly effective and conforms to, and exceeds the requirements set out by API RP 5A3. It also contains rust and oxidation inhibitors blended in unique grease that is compounded from custom-refined, low-sulphur oil. This ensures brushability over a wide temperature range, adherence to all surfaces, resistance to water washout, and prevention of rust corrosion.

Sledge Lok II Thread Lock

SH LOK-A

Sledge Lok II Thread Lock



SledgeHammer's Sledge Lok II Thread Lock represents the next generation in thread compound technology and design. Just as oil filled pipe materials and connections are engineered for specific applications and field service requirements, so must thread compounds be formed to meet critical performance requirements. Sledge Lok II has high performance rates in locking threaded connections tightly and permanently and ensuring optimal operations.



Testing Restoring Force

Centralizers provide the restoring force necessary to keep casing centered in a wellbore. Restoring force is the force exerted by the Bow Spring of a Centralizer against the casing to keep casing away from well bore wall.

The test is performed with the inner pipe and the outer pipe within 5 degrees of the horizontal. External force is applied to the outer pipe, which is then transferred to the centralizer. The load is then applied and load deflection readings are recorded three times. The process is repeated until each



Testing Facility

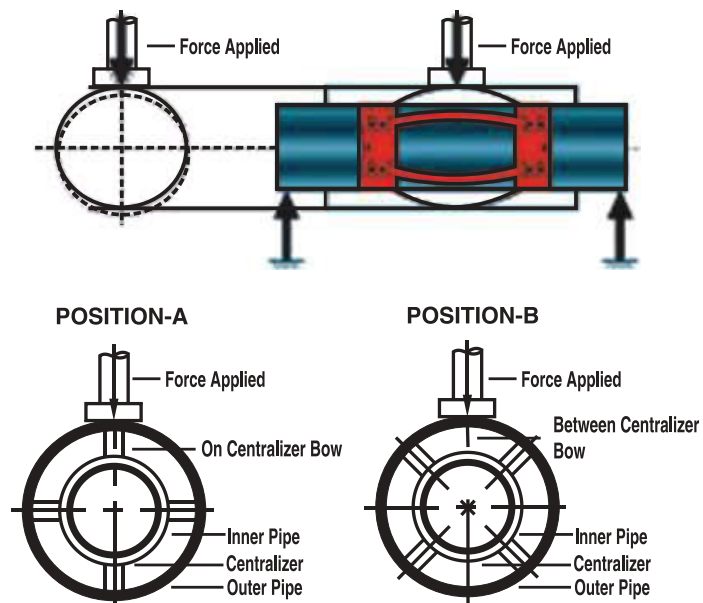


Figure A & B

spring and each set of springs has been tested with the load being applied directly above them and then in between the two springs, as shown in figure A & B.

When the minimum restoring force has been obtained and each spring has been tested, the final load deflection curve is prepared using the arithmetic means of the force reading at corresponding deflections. Restoring force is determined from this curve at 67% stand off ratio. Field experience shows that stand off values of 75-90% are adequate even in horizontal wells.



Testing Facilities

Our engineering team continues to drive excellence through their commitment to the development of new products and by consistently applying their knowledge and innovative thinking. We employ modern technology such as electronic design media, software for 3-D modeling and simulation for precision in design.

SledgeHammer is also committed to upholding global standards and we test products under special conditions to ensure that they reach or exceed industry specifications



Flow Loop Testing Facility

Flow Loop Testing Facility

SledgeHammer is a leader in the manufacture of primary cementing equipment and the use of state-of-the-art technology ensures innovative testing leading to better results for our customers.

Our in-house testing cell includes the Flow Loop Testing Facility. Our Flow Loop Testing Facility plays a key role in estimating how float equipment performs under various conditions in the field. This type of testing ensures existing, modified and new developed products strictly comply with API IIIC Specifications.

The facility successfully accomplishes simulation of specific conditions present in the real field and by doing so provides information that ultimately leads to many benefits including increases in production capacity.



Flow Loop Testing Facility

Features of SledgeHammer's Testing Cell

- Multiple testing can be performed at the same location.
- All the tests performed are well documented and reports are maintained in a test report database.
- 6S philosophy is implemented.
- Restricted entry in the testing cell.
- Illumination of red light during testing.
- High Temperature High Pressure Cell is covered for safety reasons.
- Fire Extinguishers are installed in testing area.
- Calibration and inspection of machinery is conducted periodically.
- CCTV is installed at different locations in testing area to get an overview.

Some Facts About Sledgehammer's Flow Loop Testing

- The Flow Loop Testing Facility is designed to meet the specifications of API RP 10F.
- The main part of Flow Loop Testing Facility is the Flow Loop Tank which has a storage capacity of 125 bbl attached with pumps for mud circulation and back pressure application.
- The Flow Loop Tank is fitted with two agitators to ensure that fluid remains well mixed. These agitators also prevent sagging of the weighting material in the drilling mud.
- A centrifugal pump of 150 HP is used for the pumping of drilling mud.
- A triplex pump capable of delivering up to approximately 5.55 gal/min at 7111 psi is used for back pressure testing.
- A burner with an accurately controlled temperature is installed to ensure temperatures that meet test requirements.
- Three flow meters are installed at different locations to ensure continuous measurement of the flow rate. The pump's speed is adjusted to maintain flow rate as per test requirements.
- Three pressure transducers are installed at three different locations (inlet, outlet and in the high pressure line). These continuously measure the pressure rate.
- Set up is in full compliance with the requirements of API RP 10F "Recommended Practice for Performance Testing of Cementing Float Equipment." Testing is performed on up to two specimens concurrently.
- The set up is fully equipped with a SCADA (Supervisory Control and Data Acquisition) facility that makes it possible to run the entire test from the computer reducing operator's impact on test results. This system is set to record readings of every 20 seconds. Real time readings of all the flow transducers and pressure transducers are displayed on screen when the test is being conducted. Reports of readings are produced automatically and can be printed immediately. The temperature is maintained by burner and digital values that are directly available on the main control panel's screen. This computerized methodology enhances the repeatability and accuracy of results obtained, and also improvement in speed at which tests are conducted are achieved.

High Temperature and High Pressure Cell

A High Temperature and High Pressure Cell, designed for operating temperature above 400 °F and pressure rating up to 5500 PSI which exceeds standard of API RP 10F, is constructed for applying temperature and pressure to float equipment. During testing, the entire cell is filled with silicon-based oil having a flash point of above 400 °F.

Testing: API and Planning for Beyond API

SledgeHammer has developed testing facilities as outlined in API RP 10F.

Our future plans include provision for enhancing our testing facility to test products in more demanding conditions. Areas of potential research include testing equipment at different inclination angles, higher fluid flow rates and longer circulation time of fluid etc.

Additional pressure transducers are to be installed at different locations to provide flexibility in the type of tests besides standard API tests.



SledgeHammer believes that it should play a vital role in the community and protect the world we live in. We are currently involved in organizing distribution programs of clothes and food for those who are in extreme need. We want to contribute to eradicating the problems that lead to hunger and malnutrition.

SledgeHammer is also involved in an education initiative that sets out to empower needy children/women and the destitute by providing them education so that they will become self-sufficient in order to fulfill their own basic needs.



Pg 1

SledgeHammer Foundation

Education opens doors to the road to recovery that leads away from poverty towards prosperity. In doing so it enhances self-sufficiency and plays a key role in developing a responsible society. SledgeHammer Foundation's work strives to break the vicious cycle of illiteracy by providing quality education to underprivileged children and women.

SledgeHammer does not view this work as charity but rather as a global responsibility to help empower those less fortunate and offer love, respect and commitment.

To find out more, please visit www.sledgehammerfoundation.org

"SledgeHammer respects the world we live in and believes that we have a responsibility to empower those less fortunate."



"The best friend on earth of man is the tree. When we use the tree respectfully and economically, we have one of the greatest resources on earth."



Go Green

For more details or donations please log on to www.sledgehammercare.com



"Casing Table..."

SLEDGEHAMMER OIL TOOLS PVT. LTD.																			
CASING TABLE																			
CASING OUTSIDE DIAMETER		NOMINAL WEIGHT		WALL THICKNESS		INDISE DIAMETER		COUPLING OUTSIDE DIAMETER		CASING OUTSIDE DIAMETER		NOMINAL WEIGHT		WALL THICKNESS		INDISE DIAMETER		COUPLING OUTSIDE DIAMETER	
in	mm	ib/ft	kg/m	in	mm	in	mm	in	mm	in	mm	ib/ft	kg/m	in	mm	in	mm	in	mm
4 1/2	114.30	9.50	14.14	0.205	5.20	4.090	103.88	5.000	127.00	9 7/8	250.82	62.8	93.45	0.637	16.18	8.601	218.46	10.875	276.22
4 1/2	114.30	10.50	15.63	0.224	5.69	4.052	102.92	5.000	127.00	10 3/4	273.05	32.75	48.74	0.279	7.09	10.192	258.87	11.750	298.45
4 1/2	114.30	11.60	17.26	0.250	6.35	4.000	101.60	5.000	127.00	10 3/4	273.05	40.50	60.27	0.350	8.89	10.050	255.27	11.750	298.45
4 1/2	114.30	13.50	20.09	0.290	7.37	3.920	99.56	5.000	127.00	10 3/4	273.05	45.50	67.71	0.400	10.16	9.950	252.73	11.750	298.45
4 1/2	114.30	15.10	22.47	0.337	8.56	3.826	97.18	5.000	127.00	10 3/4	273.05	51.00	75.9	0.450	11.43	9.850	250.19	11.750	298.45
5	127.00	11.50	17.11	0.220	5.59	4.560	115.82	5.563	141.30	10 3/4	273.05	55.50	82.59	0.495	12.57	9.760	247.91	11.750	298.45
5	127.00	13.00	19.35	0.253	6.43	4.494	114.14	5.563	141.30	10 3/4	273.05	60.70	90.33	0.545	13.84	9.660	245.37	11.750	298.45
5	127.00	15.00	22.32	0.296	7.52	4.408	111.96	5.563	141.30	10 3/4	273.05	65.70	97.77	0.595	15.11	9.560	242.83	11.750	298.45
5	127.00	18.00	26.79	0.362	9.19	4.276	108.62	5.563	141.30	10 3/4	273.05	73.20	108.93	0.672	17.07	9.406	238.91	11.750	298.45
5	127.00	21.40	31.85	0.437	11.10	4.126	104.80	5.563	141.30	10 3/4	273.05	79.20	117.86	0.734	18.64	9.528	235.77	11.750	298.45
5	127.00	23.20	34.53	0.478	12.14	4.044	102.72	5.563	141.30	10 3/4	273.05	85.30	126.94	0.797	20.24	9.156	232.57	11.750	298.45
5	127.00	21.10	35.86	0.500	12.70	4.000	101.60	5.563	141.30	11 3/4	298.45	38.00	56.55	0.300	7.62	11.105	283.21	12.750	323.85
5 1/2	139.70	14.00	20.83	0.224	5.69	5.052	127.32	6.050	153.67	11 3/4	298.45	42.00	65.50	0.333	8.46	11.084	281.53	12.750	323.85
5 1/2	139.70	15.50	23.07	0.275	6.99	4.950	125.72	6.050	153.67	11 3/4	298.45	47.00	69.94	0.375	9.53	11.000	279.39	12.750	323.85
5 1/2	139.70	17.00	25.3	0.304	7.72	4.892	124.26	6.050	153.67	11 3/4	298.45	54.00	80.36	0.435	11.05	10.880	276.35	12.750	323.85
5 1/2	139.70	20.00	29.76	0.361	9.17	4.778	121.36	6.050	153.67	11 3/4	298.45	60.00	89.29	0.489	12.42	10.772	273.61	12.750	323.85
5 1/2	139.70	23.00	34.23	0.415	10.54	4.670	118.62	6.050	153.67	11 3/4	298.45	65.00	99.73	0.534	13.56	10.682	271.33	12.750	323.85
5 1/2	139.70	26.80	39.88	0.500	12.70	4.500	114.30	6.050	153.67	11 3/4	298.45	71.00	105.66	0.582	14.78	10.586	268.89	12.750	323.85
5 1/2	139.70	29.70	44.2	0.562	14.27	4.376	111.16	6.050	153.67	12 3/4	323.85	45.20	67.27	0.335	8.50	12.081	306.85	13.819	351.00
5 1/2	139.70	32.60	48.51	0.625	15.88	4.250	107.94	6.050	153.67	12 3/4	323.85	50.40	75.00	0.374	9.50	12.002	304.85	13.819	351.00
5 1/2	139.70	35.30	52.53	0.687	17.45	4.126	104.80	6.050	153.67	12 3/4	323.85	58.60	87.21	0.437	11.10	11.876	301.65	13.819	351.00
5 1/2	139.70	38.00	56.55	0.750	19.05	4.000	101.60	6.050	153.67	12 3/4	323.85	65.20	97.03	0.488	12.40	11.774	299.05	13.819	351.00
5 1/2	139.70	40.50	60.27	0.812	20.62	3.876	98.46	6.050	153.67	12 3/4	323.85	77.20	111.89	0.583	14.80	11.585	294.25	13.819	351.00
5 1/2	139.70	43.10	64.14	0.875	22.23	3.750	95.24	6.050	153.67	13 3/8	339.73	48.20	71.43	0.330	8.38	12.715	322.97	14.375	365.13
5 3/4	146.05	18.00	26.79	0.303	7.70	5.144	130.65	6.535	166.00	13 3/8	339.73	54.50	81.10	0.380	9.65	12.615	320.43	14.375	365.13
5 3/4	146.05	19.70	29.32	0.335	8.50	5.081	129.05	6.535	166.00	13 3/8	339.73	61.00	90.78	0.430	10.92	12.515	317.89	14.375	365.13
5 3/4	146.05	21.90	32.59	0.374	9.50	5.002	127.05	6.535	166.00	13 3/8	339.73	68.00	101.20	0.480	12.19	12.415	315.35	14.375	365.13
5 3/4	146.05	24.40	36.31	0.421	10.70	4.907	124.65	6.535	166.00	13 3/8	339.73	72.00	107.15	0.514	13.06	12.347	313.61	14.375	365.13
6 5/8	168.28	17.00	25.3	0.245	6.22	6.135	155.84	7.390	187.71	13 3/8	339.73	77.00	114.59	0.563	14.30	12.249	311.12	14.375	365.13
6 5/8	168.28	20.00	29.76	0.288	7.32	6.049	153.64	7.390	187.71	13 3/8	339.73	80.70	120.10	0.591	15.01	12.192	309.67	14.375	365.13
6 5/8	168.28	24.00	35.72	0.352	8.94	5.921	150.40	7.390	187.71	13 3/8	339.73	98.00	145.84	0.726	18.44	11.923	302.84	14.375	365.13
6 5/8	168.28	28.00	41.67	0.417	10.59	5.791	147.10	7.390	187.71	13 5/8	346.07	88.20	131.25	0.636	16.15	12.353	313.76	14.625	371.47
6 5/8	168.28	32.00	47.62	0.475	12.07	5.675	144.14	7.390	187.71	14	355.6	94.80	141.07	0.656	16.66	12.688	322.27	15.000	381.00
7	177.80	17.00	25.3	0.231	5.87	6.538	166.06	7.656	194.46	14	355.6	100.00	148.81	0.704	17.88	12.591	319.81	15.000	381.00
7	177.80	20.00	29.76	0.272	6.91	6.456	163.98	7.656	194.46	14	355.6	112.60	167.56	0.797	20.24	12.406	315.11	15.000	381.00
7	177.80	23.00	34.23	0.317	8.05	6.366	161.70	7.656	194.46	14	355.6	114.00	169.64	0.795	20.19	12.410	315.21	15.000	381.00
7	177.80	26.00	38.69	0.362	9.19	6.276	159.42	7.656	194.46	16	406.40	55.00	81.85	0.313	7.95	15.374	390.50	17.000	431.80
7	177.80	29.00	43.16	0.408	10.36	6.184	157.08	7.656	194.46	16	406.40	65.00	96.73	0.375	9.53	15.250	387.34	17.000	431.80
7	177.80	32.00	47.62	0.453	11.51	6.094	154.78	7.656	194.46	16	406.40	75.00	111.61	0.438	11.13	15.124	384.14	17.000	431.80
7	177.80	35.00	52.09	0.498	12.65	6.004	152.50	7.656	194.46	16	406.40	84.00	125.01	0.495	12.57	15.010	381.26	17.000	431.80
7	177.80	38.00	56.55	0.540	13.72	5.920	150.36	7.656	194.46	16	406.40	94.50	140.63	0.564	14.32	14.872	377.75	17.000	431.80
7	177.80	42.70	63.54	0.626	15.90	5.748	146.00	7.656	194.46	16	406.40	109.00	162.21	0.656	16.66	14.688	373.08	17.000	431.80
7	177.80	46.60	69.35	0.687	17.45	5.626	142.90	7.656	194.46	16 3/4	425.45	70.10	104.32	0.394	10.00	15.963	405.45	17.756	451.00
7	177.80	50.10	74.56	0.750	19.05	5.500	139.70	7.656	194.46	16 3/4	425.45	76.90	114.44	0.433	11.00	15.884	403.45	17.756	451.00
7	177.80	53.60	79.77	0.812	20.62	5.376	136.56	7.656	194.46	16 3/4	425.45	83.70	124.56	0.472	12.00	15.805	401.45	17.756	451.00
7	177.80	57.10	84.97	0.875	22.23	5.250	133.54	7.656	194.46	17 7/8	454.02	94.30	140.33	0.500	12.70	16.875	428.62	19.000	482.60
7 5/8	193.68</																		



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