



CDI ENERGY PRODUCTS®
A Michelin Group Company



CDI ENERGY PRODUCTS

TUFF BREED

ADVANCED CUSTOM-ENGINEERED WELL SERVICE PACKING SOLUTIONS



SandDog® Header Ring

WSP Extreme® Series
Bronze, Silver, Gold & Platinum



ABOUT TUFF BREED®

In challenging environments where corrosive and abrasive fluids are ever-present, you need the best quality and performance from your well service packing products. Tuff Breed® well service packing is backed by over 45 years of engineering. Whatever abrasive, high-pressure, high-volume operation you have planned for your wellbore, we have you covered.



TUFF CONDITIONS DEMAND TUFF SOLUTIONS

Our engineers and manufacturing experts have collaborated with the best companies in the industry to deliver cutting-edge components to meet the heightened demands of the well service marketplace.



Tuff Breed® In Action

CDI's new WSP Products were developed to meet the level of quality and reliability you have come to expect from the Tuff Breed® line. For years now, Tuff Breed® components have been used in hydraulic fracturing and drilling operations across the US. Our components have been put to the test under some of the toughest conditions with real results.

HAYNESVILLE SUCCESS

SandDog® and WSP Extreme® Gold

- Environment: 11,500-12,000 PSI 40/70 & 100 Mesh proppant
- 500K to 1M lbs. proppant per stage and freshwater
- Stage Length/number:
 - Phase 1 – 5.5 hours per stage, 17 stages
 - Phase 2 – 3 hours per stage, 15 stages

RESULTS

CDI packing outlasted the competitor's packing in Phase 1 by 20% based on total hours. The competitor's packing was taken out after Phase 1 due to poor performance and noticeable wear on the plungers. CDI packing remained in all pumps in Phase 2 and performed during the entire cycle with no failures.

The service company shared that the plungers with CDI packing showed less wear in the Phase 1 stages than the competitor's packing. After Phase 2 was completed, the plungers using CDI packing for the entire frac job showed less wear than any plungers using the competitor's packing.

EAGLE FORD SUCCESS

SandDog® and WSP Extreme® Gold

- Environment: 10,000 psi, 100 and 200 mesh proppant
- 700k lbs. per stage
- Stage length: 2 hours
- Total stages: 162

RESULTS

CDI packing lasted 140 stages before the first set failed. The competitor's packing failed after only 100 stages and was replaced with CDI packing to complete the FRAC job. Three out of five of the initial CDI packing sets installed lasted the entire 162 stages required to complete the frac job.



CDI packing pumped 40% longer than the competition based on stages before the first failure (140 vs 100) and the service company made the decision to convert all pumps on-site to CDI packing. In addition after inspection of the plungers and stuffing boxes on all pumps, the pumps where the CDI packing was installed exhibited significantly less wear than the pumps with the competitors packing.



SandDog[®]

The header ring has been recognized as the key component in any well service packing product acting as the first line of defense against high pressures and significant proppant loads. The header ring is manufactured and designed to exclude proppant from reaching the pressure rings, and eventually the atmosphere.

Typical header rings on the market allow proppant to nibble away at the interface of the header ring and plunger. CDI has developed a revolutionary new design that forms an exclusion barrier once the SandDog header ring is installed, which drastically reduces the ability of the proppant to cause premature packing failure. The SandDog header ring is engineered with CDI's field-proven proprietary abrasion-resistant self-lubricated elastomer to further extend the life of the seal.



DESIGN FEATURES

- ID design forms an exclusion barrier once installed, eliminating proppant migration into the packing set
- The OD has a lip molded in that will trap any sand not cleaned out of the bore prior to installation
- Proprietary abrasion-resistant self-lubricated elastomer stands up to extreme temperatures and environments
- Designed to fit both new and worn packing bores

BENEFITS

- Increases uptime and productivity due to longer performance life
- Proprietary elastomer reduces wear and tear on packing bore resulting in significantly longer life of fluid ends
- Reduces TCO due to extended life performance
- Significantly reduces maintenance costs and increases uptime results in increased profitability



More Info on SandDog®

REAL RESULTS

In the field tests conducted in the Eagle Ford shale, the operator was not happy with the amount of downtime incurred for packing changes. The service company was also wearing out fluid ends at a high rate with their existing packing. CDI installed our SandDog® header ring with our WSP Extreme® Gold pressure rings to address both issues.

The well service packing set with the SandDog® performed 32% longer and exhibited less stuffing box wear than the other competitors.

As a result, the service company converted all fleets to use the SandDog® header rings.

AVAILABILITY

- The SandDog® header ring is available in all common pressure pumping sizes
- Also available in smaller sizes commonly used in cementing and coil tubing operations

One of CDI's Core Values is our dedication to Customer Success. Our products must do more than merely meet our standards. They must deliver optimum performance that helps our customers achieve real results and tangible ROI.

TESTIMONIALS

CDI's field training program sets them apart from the competition. In North Dakota, we have limited time when our crews are in the shop. Sometimes they don't arrive until late in the evening. The CDI field personnel came to our shop every night for a week, after hours, to train our team on the proper way to install packing. Now, we are using less packing and we have more time to spend on other maintenance issues.

- Service company, Williston ND

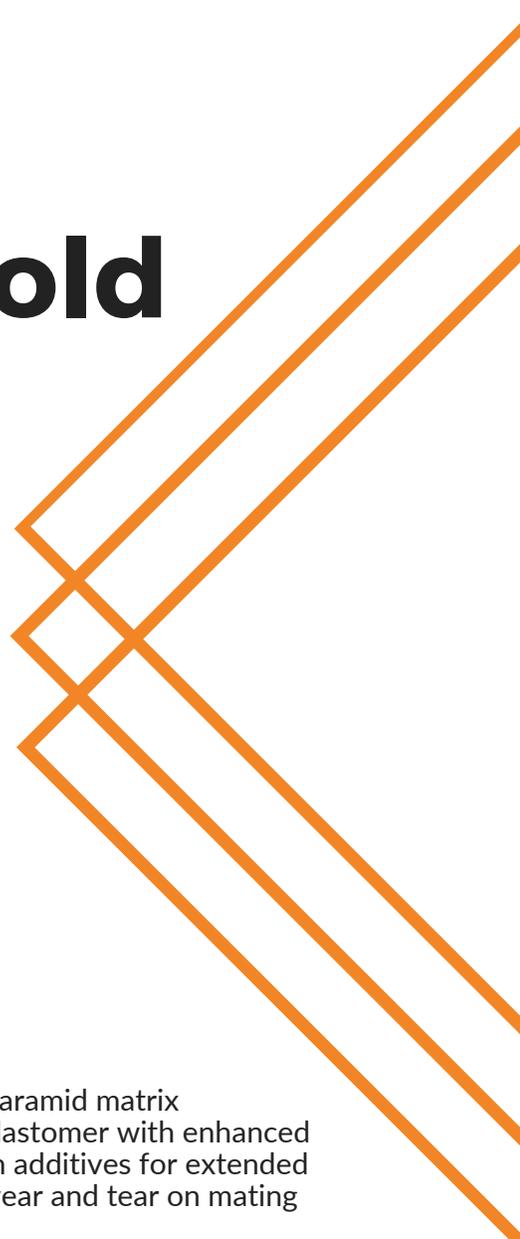
What we appreciate at CDI is their commitment to customer service. Whether you need an answer from inside sales, engineering or field sales, the CDI team is dedicated to getting you answers and solving your problem. They understand this is a 24/7 business and unlike their competitors, they act like it.

- North American Distributor



WSP Extreme® Gold

Horizontal drilling and multistage hydraulic fracturing have changed the world in which we live. Oil and gas can be produced at unprecedented rates, but for this to happen all associated equipment needs to be able to withstand extreme environments including pressures, proppant loads, and extended service life requirements. CDI engineered WSP Extreme® Gold to meet these challenging service needs. The aramid fabric matrix combined with a proprietary gold elastomer results in a pressure ring that can withstand the pressures and proppants service companies incur every day. WSP Extreme® Gold minimizes the wear on stuffing box bores due to the unique elastomer binder but withstands the pressures and proppants seen in today's applications.



FEATURES

- Proprietary 100% aramid matrix
- Engineered gold elastomer with enhanced internal lubrication additives for extended life and reduced wear and tear on mating surfaces

BENEFITS

- Less wear on mating surfaces results in increased uptime and extended packing life
- TCO is reduced across fleets
- Maintenance intervals can be extended

COMBINED
STRENGTH

The engineered relationship of the Header Ring and Pressure Rings is the key to any successful well service packing product. Our SandDog® header ring with its exclusion shelf, coupled with the superior materials of one of our WSP Extreme® Series pressure rings results in the best performing well service packing available today. When the SandDog® Header Ring and quality pressure rings are combined, CDI delivers:

- Longer life
- Less wear on stuffing box bores
- Less wear on plungers
- Overall better TCO



The relationship between the Header Ring and the Pressure Ring



WSP Extreme[®] Silver

CDI has developed the next generation of Aramid composite pressure rings to meet the increasing need for an economical product that will still stand up to the extreme pressures and proppant loads required to fracture wells today. Our engineers researched materials and developed our proprietary fabric to achieve superior strength at a price point to meet market demands.

DESIGN FEATURES

- Aramid composite material for strength
- Abrasion-resistant elastomer coating for extended life
- Composite fabric minimizes wear on mating surfaces

BENEFITS

- Economic material construction delivers lower TCO for operators
- Proven aramid-based materials extend operational life
- Less wear on mating surfaces decreases costs and downtime

PERMIAN BASIN SUCCESS - WSP Extreme[®] Silver

- Environment Pressures: 8,000 – 9,500 psi
- Proppant size: 100 mesh / 600,000 lbs. per stage
- Average stage length: 3-3.5 hours

The service provider adhered to a short maintenance interval to minimize wear and tear on the equipment and to minimize costly unplanned downtime. WSP Extreme[®] Silver was developed to address both requirements. The proprietary aramid fabric blend has the strength required for high-pressure services but is less abrasive than many products in the market today. A special elastomer binder adds protection to all mating surfaces.



RESULTS

- Lasted the full maintenance interval
- Pumped 20M lbs. of proppant per maintenance interval
- Exhibited less wear on stuffing box bores and plungers than the competition

The service provider was able to retain the same maintenance interval with WSP Extreme[®] Silver with a reported operational cost saving in excess of 40%.

High-Performance Polymer Products for the Energy Industry and Beyond

With over 45 years of experience, CDI is an industry leader in the design, manufacturing, and processing of high-quality, high-performance polymer products and components for Oil & Gas, LNG, Fluid Handling, Aerospace, Power Generation, Refining & Petrochemical, Industrial Processing, and beyond. We are highly experienced in a broad scope of advanced materials – from elastomers to advanced fluoropolymers and thermoplastics. With strategic locations around the globe, we provide critical solutions, on time and to your specification, anywhere in the world.

Tuff conditions put tuff demands on performance-critical equipment.

As technological advancements in hydraulic fracturing, products must be capable of withstanding new challenges and complexity. Meeting and exceeding the demands are what we do best.



CONTACT US TO GET MOVING ON YOUR NEXT PROJECT
WWW.TUFFBREED.COM

