MetalSkin®
Cased-Hole Liner System

Using advanced solid expandable technology to reduce costs, optimize completion size and ultimately maximize production and ROI.
Weatherford’s MetalSkin® cased-hole liner is a solid-tubular expandable system that addresses the most common and challenging casing-remediation applications.

The MetalSkin system is a robust liner (or clad) that seals and isolates damaged casing or perforations. It bridges the gap in casing repair between cement squeezing and scab liners. The system provides permanent isolation and eliminates repeated workover operations. Most importantly, it provides a larger ID and better access than scab liners for future drilling, completion, production or injection operations.

The MetalSkin cased-hole liner combines the experience gained through thousands of installations of legacy expandable products and the advanced technology of solid-pipe expansion. The result is a highly reliable and robust system that provides enhanced burst and collapse resistance. The capability to connect multiple joints enables the liner to be customized to suit specific well objectives.

As a pioneer in expandable systems with tens of thousands of installations, Weatherford continues to enhance the technology. Our efforts have resulted in the MetalSkin family—the most technologically advanced cased-hole and open-hole solid expandable systems on the market.
Solid answers to mature-field challenges

The *MetalSkin* cased-hole liner system is designed to deal with challenges such as excessive water production, reservoir sweep inefficiency and aging wells.

**Mechanical casing failure:**
- Casing corrosion
- Casing splits
- Collar leaks
- Buckled Casing
- Parted Casing

**Production or injection optimization:**
- Water shutoff
- Zonal isolation
- Eliminating thief zones
- Covering unwanted perforations
- Sealing off laterals & sidetracks

The value of the *MetalSkin* cased-hole liner system is two-fold: it is permanent and it provides a larger through bore than other mechanical solutions. Once it is installed, drilling, stimulation, completion or injection operations can begin, all with one objective: place larger pipe into the production zone.

Rather than a short-term fix, such as squeezing cement, the system provides a reliable, long-term solution to operational challenges.
Solid and reliable system
for increased production capacity

The MetalSkin® cased-hole liner’s simple design results in a remedial liner system that can be quickly installed and is highly reliable. In many cases, the system can be installed in one day, minimizing nonproductive time and maximizing re-completion options. In mature fields, it may be your most valuable asset management tool.

Quick, reliable expansion process
The installation process takes minimal rig time once the well is prepared. When the MetalSkin system is positioned correctly, applied surface pressure expands and sets the anchor. The rig then pulls the cone through the liner, expanding it from the bottom up. The ID of the expandable liner and the connections are never exposed to expansion pressure, thus maintaining integrity of the system. This method simplifies the installation and enhances safety and reliability while reducing operational risks.

Time saved with no drillout
This single-trip system requires no drillout after installation. There is no shoe to house the expansion cone, so the liner OD is minimized to ease run in. No darts, plugs or shoes are required to generate pressure when the anchor is set, so there is nothing to drillout.

Optimized production
Once installed, the MetalSkin cased-hole liner provides larger through-bore access to lower zones compared to alternative solutions. It is a reliable, long-term isolation system that can be custom designed to cover long intervals with multiple joints of expandable pipe. Most importantly, it enables optimum recompletion design to enhance production and reservoir management.
**MetalSkin cased-hole liner**

*versus conventional alternatives*

The MetalSkin cased-hole liner provides permanent casing repair with minimal ID reduction. It is installed in a single trip and requires no cement or drillout. The larger ID enables optimal completion designs to maximize production or injection rates.

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**Isolation Straddle**

- Smallest ID: 4.000-in. ID
- 7-in. 20.0#

**Conventional Liner**

- Reduced ID: 4.892-in. ID
- 7-in. 20.0#

**MetalSkin Cased-Hole Liner**

- Largest ID: 5.678-in. ID
- 7-in. 20.0#

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**Cement Squeeze**

- Unpredictable (multiple squeezes may be required)
- High Risk (formation exposed to high pressures)

**MetalSkin Cased-Hole Liner**

- One-trip, reliable solution
- Short Term (cement breaks down)

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Solid performance advantages
the only solid-expandable, cased-hole liner with no drillout required

A leader in solid-expandable technology, Weatherford has drawn on its extensive experience to develop the most advanced cased-hole liner system on the market.

Key advantages of the MetalSkin cased-hole liner system include:

- **Elastomer seal elements** can be located anywhere in the liner to provide annular isolation between expanded pipe and parent casing.
- **Top cap** supports expansion forces created when applied pressure sets anchor.
- **Slide valve** has an open port that enables circulation while run in hole (RIH); it closes to allow applied pressure to activate expansion cone.
- **Bumper jar** ensures reliable operation of the slide valve and hold-down subs in low-volume wells.
- **Hydraulic hold-down sub** secures system in place while hydraulic forces set anchor.
- **Hydraulic setting tool** has low-pressure, high-force pistons that drive the jack to set anchor.
Expandable connections offer a proprietary design that is field proven. It is designed to exceed proposed API performance specifications to ensure optimal and consistent performance.

Expandable casing features a thick-wall, high-grade seamless pipe that enhances post-expansion performance and is resistant to expansion-induced wear.

Carbide anchor is set with hydraulic pressure and secures the bottom of the liner to the parent casing, enabling full system expansion.

Debris sub protects cone from downhole debris.

GS spear stabs into preinstalled cone and connects running string to the liner.

Cone assembly is preinstalled in anchor joint before RIH. Hydraulic pressure activates the cone to set the anchor.

Shoe has full-bore ID after expansion; no drillout required.
Quick, one-trip installation for a reliable, long-term solution

Weatherford’s MetalSkin® cased-hole liner system is a one-trip system designed to convey and install an expandable solid-tubular liner inside existing casing. The running sequence is simple and straightforward.

Prepare well, make up expandable liner, and hang in rotary.

Stab in work string and run to depth.

Apply hydraulic pressure to activate the expansion tool, initiate expansion, and set the anchor.

Release pressure and continue to expand the liner by applying direct overpull while tripping out of the hole.

NO DRILLOUT REQUIRED. Continue rig operations.

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Solid results
from around the world

USA (California)
MetalSkin cased-hole liner sealed off a perforated thief zone to restore re-effective injection rates and pressures in a water-injector well in an aging field that was first produced in the 1920s.

USA (Texas)
MetalSkin cased-hole liner was used to repair long interval (165 ft/50 m) and to place 70-year-old injector well back on line in just three days.

Azerbaijan (Caspian Sea)
MetalSkin cased-hole chrome liner overcame prolific field’s extreme pressure and temperature variances [0 to 9,000 psi (0 to 62,053 kPa) and 40° to 190°F (4° to 88°C)] to repair leaky offshore gas well and restore production to the previous level of 55,000 BOE/d.

Saudi Arabia
MetalSkin cased-hole system was used to repair a badly corroded 7-in. liner of an offshore oil well located in an area where a highly corrosive aquifer frequently creates cementing challenges—resulting in restored production.

Libya
MetalSkin cased-hole system was used to repair a casing leak, turning a water-producing, onshore well into an oil producer of more than 800 bbl/d and marking the debut of solid expandable technology in Libya.

Colombia
MetalSkin cased-hole system sealed off water-producing zone and maximized production. Installation was completed in less than 24 hours, which reduced downtime significantly, relative to the use of a scab liner.

Norway (North Sea)
MetalSkin cased-hole liner was used to repair extensive damage over a 2.5-ft (0.76-m) section of casing in an offshore injector well, enabling injection of carbon dioxide (CO₂) and ultimately enhancing production of 10 producer wells.

Libya
MetalSkin cased-hole system was used to repair a casing leak, turning a water-producing, onshore well into an oil producer of more than 800 bbl/d and marking the debut of solid expandable technology in Libya.

For more information on these Real Results and others, visit weatherford.com/realresults.
Advancing the design of solid-expandable liner connections

Weatherford established the **Oil Country Tubular Goods (OCTG) Technology Center** to define more precisely the performance parameters of threaded connections in solid-expandable liners and ultimately to enhance their design.

Conventional methods of testing threaded connections fall short on two fronts: creating samples that accurately reflect their downhole counterparts and adequately accounting for factors that can affect connection performance, such as high-dogleg severity, variations in pre- and post-expansion loads, pressure and constraint (fixed-free versus fixed-fixed). Capable of replicating mechanical, variable-load and fixed-load liner expansion, the **dynamic load expansion (DLX)** simulator (patent pending) produces samples that accurately reflect their downhole counterparts, which translates to more accurate test results.

Unlike conventional testing of expandable connections, the DLX simulator can uniquely and accurately replicate downhole conditions that the expanding casing experiences in a real well environment.

The one-of-a-kind simulator has two 15-ft (4.6-m) stroke cylinders that apply compression to the work piece; a third applies tension and adjusts for length change during expansion. The capability to maintain a pre-expansion load in front of the expansion cone and a post-expansion load behind the cone makes the DLX uniquely realistic.

The first of its kind, Weatherford’s OCTG Technology Center uses data from the specialized testing equipment to design next-generation connections with better strength and sealing properties—before, during and after expansion—relative to their conventional equivalents.
The MetalSkin cased-hole liner system minimizes slimming of the well profile post-repair—reducing costs, optimizing completion size and ultimately maximizing ROI. To find out more about how our family of advanced MetalSkin systems can minimize unscheduled events, reduce well construction costs, and increase reservoir exposure and production, please contact an authorized Weatherford representative, or visit weatherford.com/metalskin.

The Solid Choice™ from the expandable experts