Weatherford®

MetalSkin®

Monobore Open-Hole Liner System

THE SOLID CHOICE™

Maintaining monobore ID from the previous casing string to the liner shoe, saving hole size and isolating trouble zones

Saving Hole Size

while isolating trouble zones

Weatherford's MetalSkin® monobore open-hole liner system is a solid expandable drilling liner that is run to cover a trouble zone and ties back to the shoe of the previous casing string.

Our liner system **maintains the same drift** as the previous casing enabling the operator to **maintain original drilling plan to TD**. This system is the only expandable liner available with this functionality, as well as advanced running tool, tubular and connection technology.

Part of the *MetalSkin* family of solid expandable systems, the monobore open-hole liner mitigates the telescoping effect of conventional well designs, deals with and reduces wellbore instability events. This allows for optimal completion size, and extends the capability to **successfully drill in narrow pore-pressure/fracture-gradient zones**.

As a pioneer in solid expandable systems, 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.

Reducing nonproductive time

by mitigating drilling hazards and maintaining hole size

Complete the well as planned without compromise. The *MetalSkin* monobore open-hole liner system mitigates unexpected drilling hazards by isolating problem zones while optimizing casing and completion design.

Improves

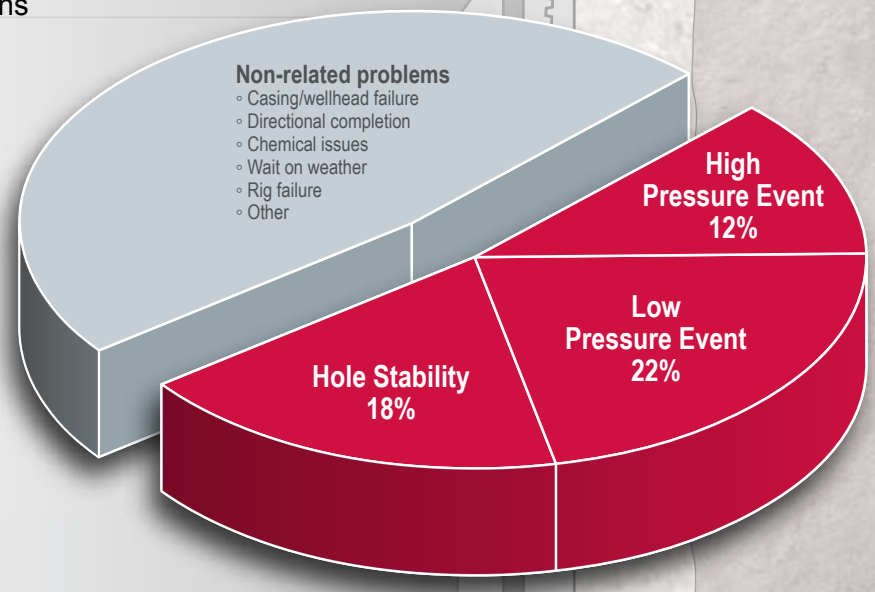
- cementing efficiency
- access for future well interventions

Mitigates

- high-pressure anomalies, such as kicks and flows
- low-pressure events, such as lost circulation

Reduces

- wellbore instability problems, such as twistoff and stuck pipe
- the number of casing strings



More than 50 percent of all nonproductive time problems are related to drilling hazards. The *MetalSkin* monobore open-hole liner can be an effective means of mitigating those hazards.

Chart source: James K. Dodson Company

Providing solid ideas
for expanding your options

The MetalSkin® monobore open-hole liner system provides primary or contingency solutions without compromising completion objectives.

Optimize completions and maximize production

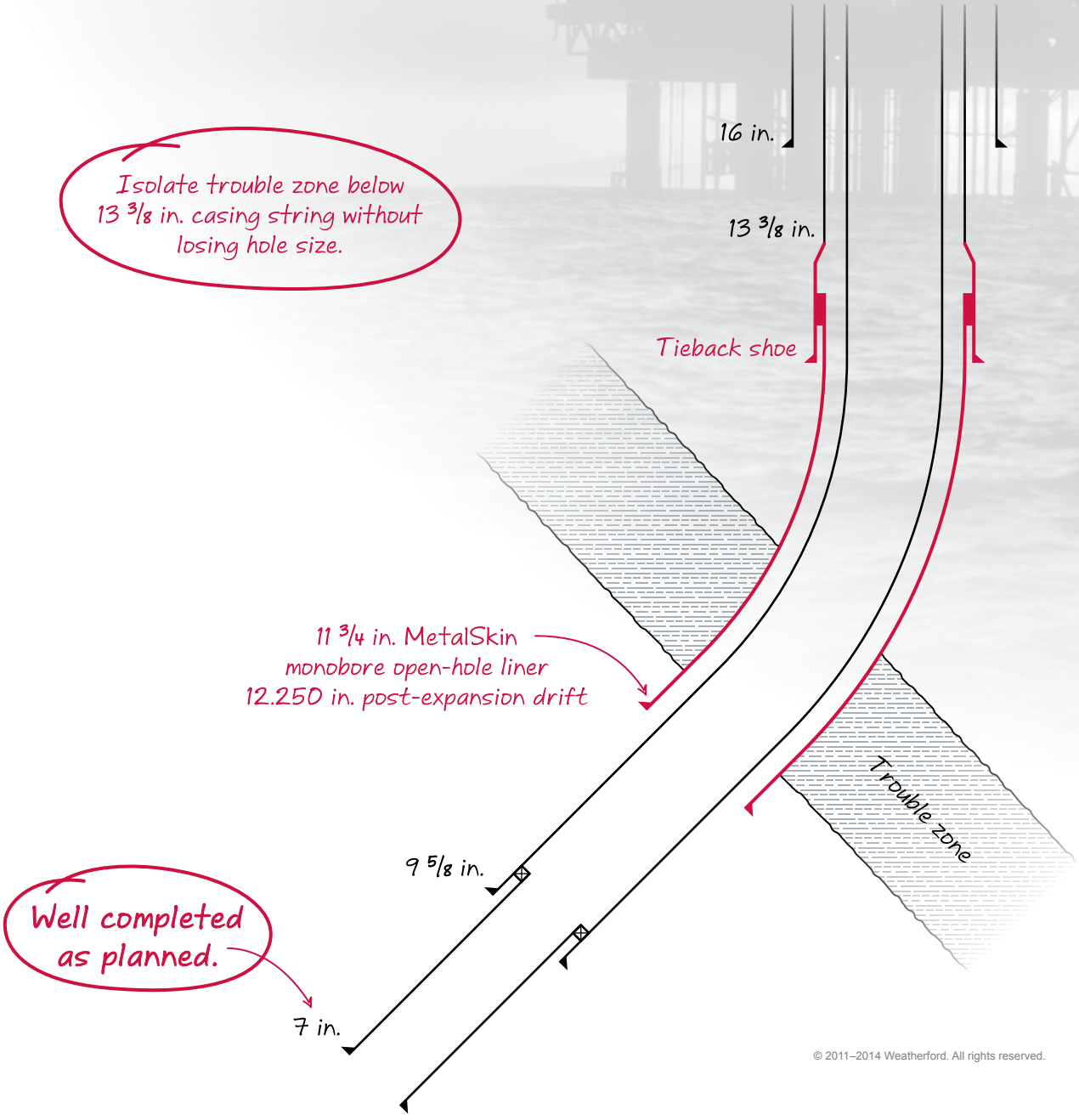
The *MetalSkin* monobore open-hole liner system enables maximum return on investment (ROI) and accelerated production payout by increasing hole size in the target reservoir and upsizing the completion. Alternatively, it can be used to downsize tophole casing design and maintain optimum casing geometry through the production zone.

- Enables drilling in narrow pore-pressure/fracture-gradient zones
- Extends achievable well depth
- Optimizes completion geometry

The *MetalSkin* monobore open-hole liner tieback shoe provides casing options and insurance to maintain desired hole size if drilling hazards are encountered.

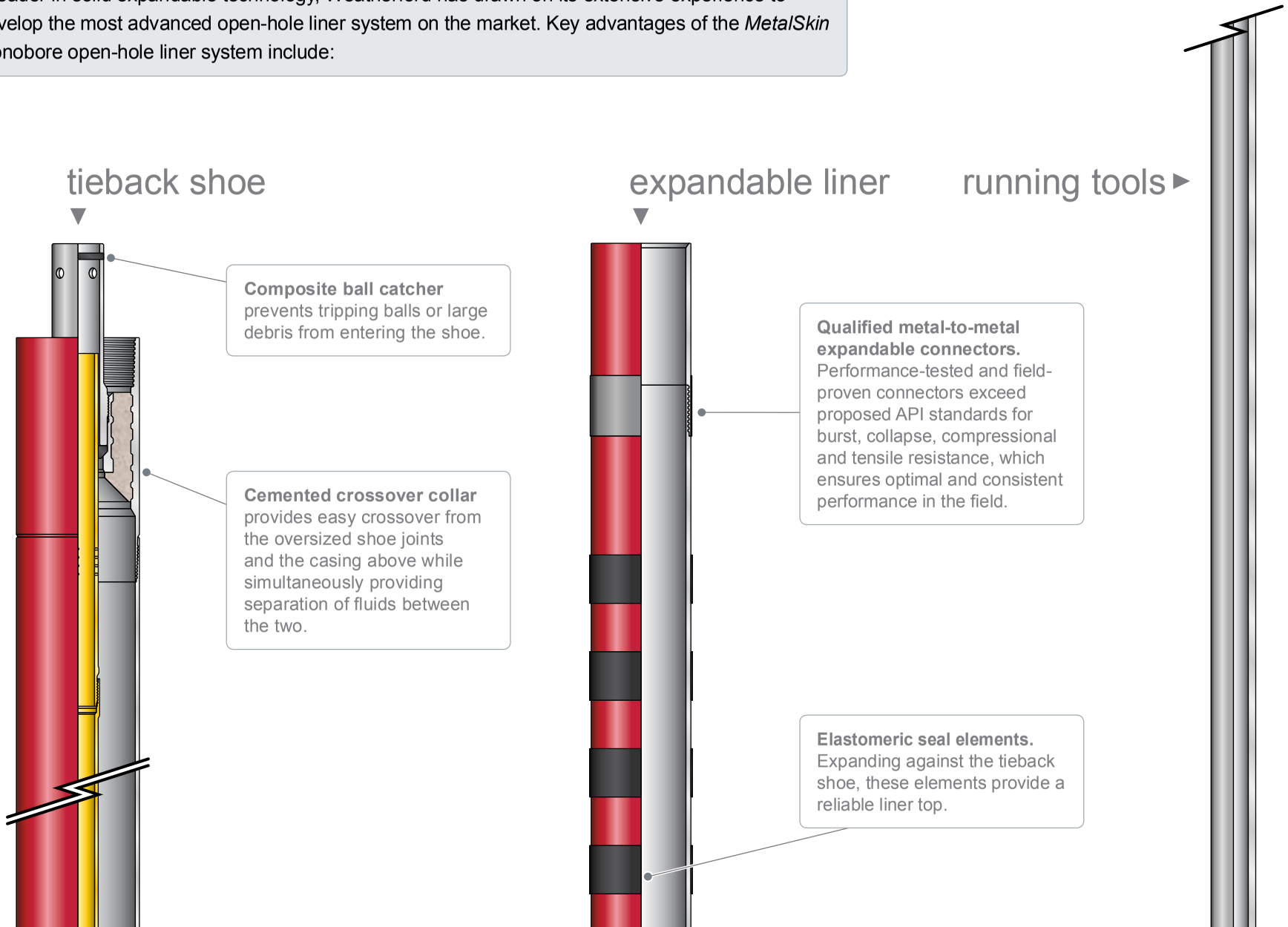
Preserving hole size
while mitigating drilling hazards

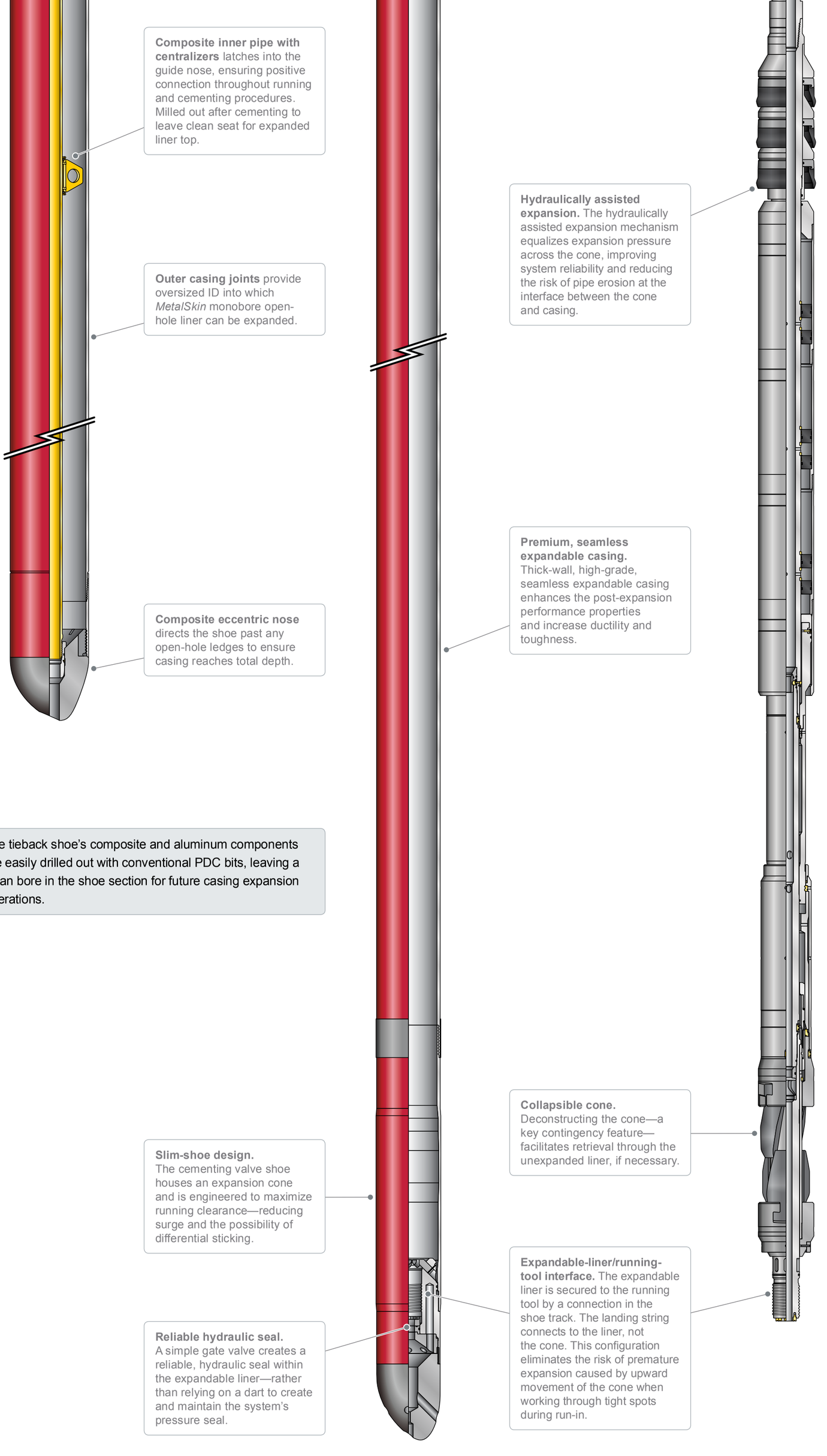
The *MetalSkin* monobore open-hole liner system minimizes problems such as lost-circulation zones, subsalt and rubble zones, overpressured formations and shallow zones that flow.



Solid performance advantages
of the *MetalSkin* monobore open-hole liner system

A leader in solid expandable technology, Weatherford has drawn on its extensive experience to develop the most advanced open-hole liner system on the market. Key advantages of the *MetalSkin* monobore open-hole liner system include:





Composite inner pipe with centralizers latches into the guide nose, ensuring positive connection throughout running and cementing procedures. Milled out after cementing to leave clean seat for expanded liner top.

Outer casing joints provide oversized ID into which *MetalSkin* monobore open-hole liner can be expanded.

Composite eccentric nose directs the shoe past any open-hole ledges to ensure casing reaches total depth.

Hydraulically assisted expansion. The hydraulically assisted expansion mechanism equalizes expansion pressure across the cone, improving system reliability and reducing the risk of pipe erosion at the interface between the cone and casing.

Premium, seamless expandable casing. Thick-wall, high-grade, seamless expandable casing enhances the post-expansion performance properties and increase ductility and toughness.

The tieback shoe's composite and aluminum components are easily drilled out with conventional PDC bits, leaving a clean bore in the shoe section for future casing expansion operations.

Collapsible cone. Deconstructing the cone—a key contingency feature—facilitates retrieval through the unexpanded liner, if necessary.

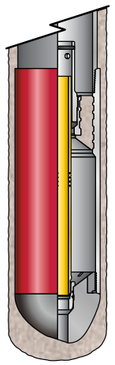
Slim-shoe design. The cementing valve shoe houses an expansion cone and is engineered to maximize running clearance—reducing surge and the possibility of differential sticking.

Expandable-liner/running-tool interface. The expandable liner is secured to the running tool by a connection in the shoe track. The landing string connects to the liner, not the cone. This configuration eliminates the risk of premature expansion caused by upward movement of the cone when working through tight spots during run-in.

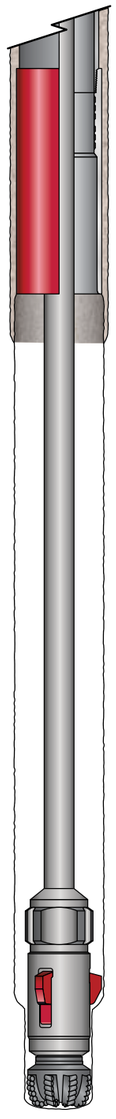
Reliable hydraulic seal. A simple gate valve creates a reliable, hydraulic seal within the expandable liner—rather than relying on a dart to create and maintain the system's pressure seal.

Expanding reliability

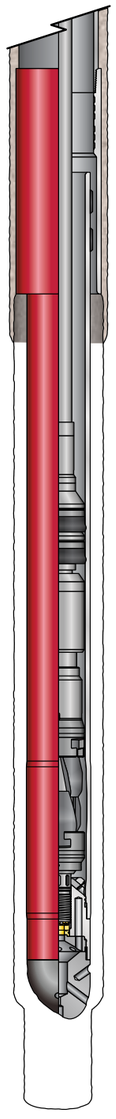
MetalSkin® monobore open-hole liner system



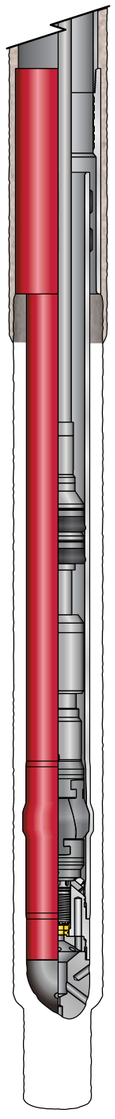
Run tieback shoe on bottom of 13 3/8-in. casing and pump cement.



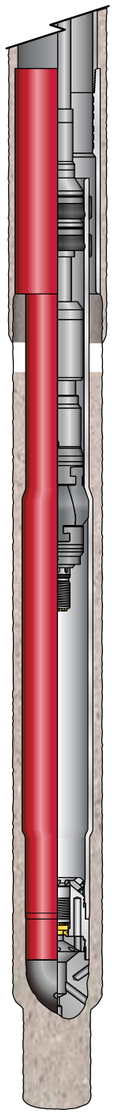
Drill out guide nose, drill ahead and underream hole section.



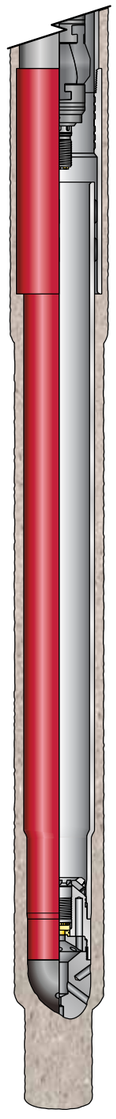
Run in hole with expandable liner and setting tool.



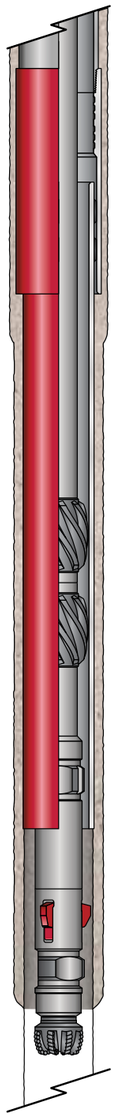
Drop ball and pressure up to form cone.



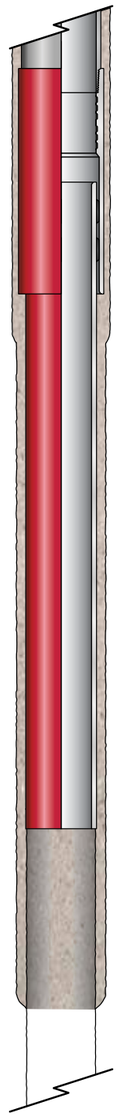
Pump cement, release setting tool, and pressure up to expand liner.



Cone exits top of liner using rig overpull.



Run in hole with mill/drill assembly and drill out shoe.



Pull out of hole with mill/drill assembly and continue drilling operations.

Delivering solid answers

with the *MetalSkin* monobore open-hole liner system

The *MetalSkin* monobore open-hole liner system begins with the tieback shoe that is run on the casing string above the planned monobore liner installation. This shoe is designed for easy installation and requires no special running or cementing procedures. The expanded liner ties back into the shoe resulting in a monobore ID.

Installing the tieback shoe

The shoe track has a composite pipe that runs the length of the assembly. Once the casing is landed, cement is displaced down the casing and through the inner pipe that protects the bore of the shoe track from the cement slurry. After the plug lands above the shoe track, the components are drilled out with conventional PDC drilling assemblies. The shoe track is compatable with standard shoe test procedures and has a clean bore for future liner expansion operations.

Premium metal-to-metal connections ensure system reliability.

Running the liner

When the next section of hole is drilled, the *MetalSkin* monobore open-hole liner system is made up to the required length and hung in the rotary table. The expansion tool is pre-installed in the shoe of the liner. A false rotary is built, and an inner string is run inside the liner. The inner string attaches to the expansion tool; and the liner is then run to depth.

Expanding the liner

Once the liner is on bottom and the cement job is completed, hydraulic pressure expands the liner from the bottom up. The top of the liner expands and anchors into the tieback shoe giving it the same drift ID as the casing above. No darts are required to achieve hydraulic integrity; the pipe is thick-walled and seamless; and the connections exceed API proposed standards. After expansion, the shoe is removed with a fit-for-purpose mill/drill assembly; and the well is monobore from the top of the previous casing to the bottom of the liner.

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.

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.

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.

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.

MetalSkin® Monobore Open-Hole Liner System

The Solid Choice™ from the expandable experts

The *MetalSkin* monobore open-hole liner system is a solid expandable drilling liner that mitigates the telescoping effect inherent in conventional well design—saving hole size while isolating trouble zones. To find out more about how our family of advanced *MetalSkin* systems minimizes unscheduled events, reduces well construction costs, and increases reservoir exposure and production, please contact an authorized Weatherford representative, or visit **weatherford.com/metalskin**.

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