



Weatherford[®]

Casing Wiper Plugs and Darts



Cement integrity starts here.

There is more to cementing a well than just cement. Offering you more engineering expertise and more technology with more reliability than anyone else in the industry.



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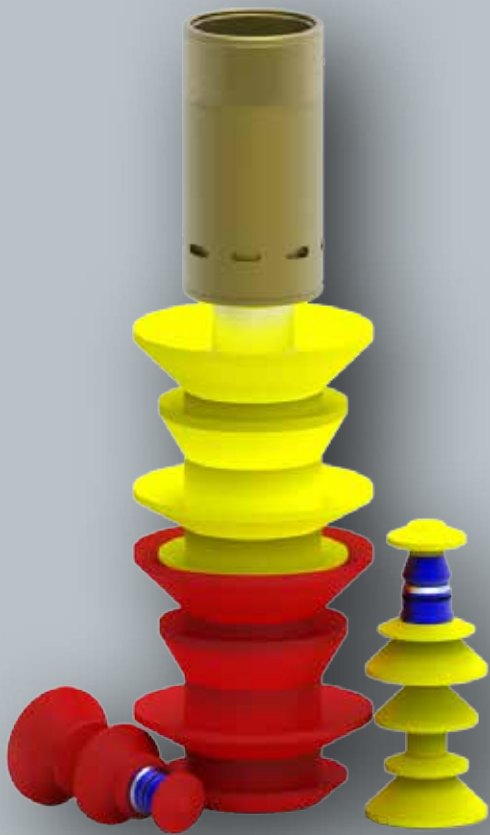
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Introduction

Built for the Integrity of Your Well

Well integrity begins with the cementing process. Proper cementing operations have more rigorous requirements for today's complex drilling environments. As operations move into deeper waters and unconventional applications, with higher angles, pressures and temperatures, the cementing equipment needs to not only meet these requirements, but exceed them. In addition, proper planning and execution are crucial elements to the operation.

For more than half a century, the industry has depended on Weatherford to provide top-quality equipment for primary cementing operations in the world's toughest operating environments. Our extensive experience enables us to design and manufacture only the highest quality products with proven performance. Each product is engineered to deliver superior value and unsurpassed reliability for assured wellbore integrity.

With plug designs built from high-pressure polyurethane to high-temperature HNBR (hydrogenated nitrile butadiene rubber) material, we have systems for subsea, surface, liner, extended-reach and multistage cementing applications. These systems are compatible with a wide range of wellbore fluids, and their superior wiping performance helps reduce well-construction costs.*



*Note: Temperatures and fluids affect plug performance. To select the appropriate cement plug system for your application, please contact a Weatherford representative.

A Systems Approach to Product Development

A manufacturer of cementing products for more than 50 years, Weatherford is the leader for a reason. Our engineering staff is driven by customer needs and dedicated to new product development. Because of industry demands, we have implemented a comprehensive global quality process focused on one goal: delivering the most reliable, cost-efficient products in the market. For the highest-quality product delivery and functionality, we have developed standardized quality plans at multiple levels that document and distribute all manufacturing specifications and testing requirements. We have also developed comprehensive field-installation procedures, along with technical and training competency standards, which are critical in achieving operational success.

We offer the most complete line of cementing wiper plugs in the industry. They separate displacement fluid, effectively wipe tubulars, and reduce cement contamination during cementing operations in virtually all well conditions. Our wiper plugs are constructed primarily of high-abrasion, wear-resistant polyurethane to withstand high bump pressures and high-pressure casing tests. We offer a variety of plug systems, including subsurface release and surface release plugs and specialty plugs and darts, to meet casing- and liner-running applications. These plugs, as well as our landing collars, float collars, and shoes, are compatible with all cementing operations. And in pressure-sensitive formations and close-tolerance casing programs, our autofill float collars with antirotation plug systems provide superior performance in the most critical environments.

As a global, single-source, well-construction organization, Weatherford provides cementing products, liner hangers and inflatable packers to every major oil-and-gas market in the world for quality-critical applications. We offer a full fleet of complementary products that are designed and manufactured to ensure complete system compatibility for enhanced wellbore integrity.

The products and services described below are fully compatible with the well-construction process, providing improved wellbore integrity and economics.



- Weatherford's cementing heads enhance the efficiency of cementing operations by releasing setting balls and drillpipe darts without breaking connections.
- Our centralizers provide maximum standoff for efficient mud and cement displacement, achieving the best possible chance of zonal isolation.
- Weatherford's SurgeMaster™ II multiple-opening diverter tool reduces surge pressure and mud loss while increasing casing and liner running speeds.
- The Micro-Seal™ isolation system safeguards long-term well integrity by preventing the unwanted migration of well fluids through microannulus leak paths between the casing and cement sheath.
- Our liner hanger designs allow high circulation rates past the liner-top assembly for enhanced debris removal during well cleaning, improving the quality of cement displacement.

Float-Equipment Compatibility

Weatherford's plugs and float equipment are specially designed for compatibility, ensuring the necessary face seal to withstand high bump pressures and casing tests. Our float equipment includes float collars and shoes with the industry-leading Sure-Seal 3™ valve, meeting API RP10F requirements and performing several functions. The shoe guides casing to total depth, the valve prevents contaminated mud from entering the casing string and the collar provides a landing point for the casing wiper plugs. The float collar also acts as a back-up to the float shoe. Our industry-leading float collars and shoes, built to withstand long periods of circulation and high flow rates, are available in all common casing sizes and are suitable for use in any well geometry.

The WiperLok® System

The *WiperLok* system combines Weatherford's uniquely designed nonrotational cementing plugs with float collars and shoes.

How the *WiperLok* system works

The system starts with Weatherford's elastomer wiper plugs, which are designed with a patented interlocking mechanism. The construction allows the top and bottom plugs to be secured to each other, as well as to the float or landing collar when rotational force is applied. This innovative design resists rotation as drillout weight is increased and allows the plugs to lock in any casing inclination.

The system allows significantly faster drillout times with either PDC (polycrystalline diamond composite) or roller cone bits, and the one-piece core ensures that the antirotational device will not shear during drillout. Field results have shown that plug drillout can be in as little as 5 minutes, and complete drillout of the system can be accomplished in less than 20 minutes. These plugs drill out best with light weight on bit (WOB) and higher rotary speed (rpm).

Industry-Leading Technology

- Weatherford's world-class *Sure-Seal 3* float collar incorporates a unique PDC-drillable spring-loaded phenolic plunger valve with an easily drilled, nonferrous spring. This float collar offers quick PDC drillability through compatible materials and design, high-strength shell design for high-pressure plug bump and backflow resistance and the capability to withstand long periods of circulation and high flow rates.
- Weatherford's large-bore autofill float equipment represents state-of-the-art autofill cementing valve technology, reducing surge pressure as casing is run. The wide throat allows the passage of well fluids up the inside of the liner and drillpipe, rather than forcing it around the restricted OD, thus reducing surge pressure on the open hole. Weatherford recommends using our patented filter shoe to prevent passage of solids and drilled cuttings into the liner ID where they could inhibit functionality of hydraulically activated tools.



Plug Compatibility Chart^a



Features	Subsurface Plugs													Surface Plugs				Surface Dart							
	Dual Plugs							Single Plugs						Dual Plugs		Multiple Latch-In Plugs		Single Dart							
	Engineering product name	Dual Wiper Plug (DWP)		Sub-Surface Release Mid-Bore (SSR-MB) Plug System		SSR-MB Plug System with Plug Locator System (PLS)		Sub-Surface Release Large-Bore (SSR-LB) Plug System		854BS Liner Plug Set (Hydraulic Stage Tool System)	854BS Liner Plug Set (Hydraulic Stage Tool System)	Dual-Wiper Plug (DWP) Top Only			Model 837BC Sub-Surface Release Top Plug System	Model 837BC Sub-Surface Release Top Plug System (without Ball Cage)	Casing Wiper Plugs		Multiple Latch-In Plug System		Inner-String Latch-In Stinger Dart				
New product name	Sub-Surface Release™ Small-Bore (SSR-SB) Plug System		Sub-Surface Release Mid-Bore (SSR-MB) Plug System		SSR-MB Plug System with Plug Locator System (PLS)		Sub-Surface Release Large-Bore (SSR-LB) Plug System		854BS Liner Plug Set (Hydraulic Stage Tool System)	854BS Liner Plug Set (Hydraulic Stage Tool System)	SSR-SB Top Plug			Model 837BC Sub-Surface Release Top Plug System	Model 837BC Sub-Surface Release Top Plug System (without Ball Cage)	Surface-Release Casing-Wiper Plug		Surface-Release Casing-Wiper Plug with PLS		Multiple Latch-In Plug System		Inner-String Latch-In Stinger Dart			
Engineering model number ^b	SRSBL-XXXX-HP or SRSBL-XXXX-LP	SRSB-XXXX-HP or SRSB-XXXX-LP	SRMB-XXXX-HP or SRMB-XXXX-LP	SRMBS-XXXX-HP or SRMBS-XXXX-LP	SRMBL-XXXX-HP or SRMBL-XXXX-LP	SRMB-XXXX-HP01 or SRMB-XXXX-LP01	SRMB-XXXX-HP03 or SRMB-XXXX-LP03	SRLB-XXXX-HP or SRLB-XXXX-LP	SRLBS-XXXX-HP or SRLBS-XXXX-LP	854BS-XXXX-HP	854BS-XXXX-HP	SSRTL-XXXX-HP or SSRTL-XXXX-LP	SSRTN-XXXX-HP or SSRTN-XXXX-LP	SSRTS-XXXX-HP or SSRTS-XXXX-LP	837BC-XXXX-HP	837BC-XXXX	CNPT-XXXX or CNPB-XXXX	CSPT-XXXX or CSPB-XXXX	CNPT-XXXX-PLS	CSPT-XXXX-PLS	CPLT-XXXX or CPLB-XXXX	CPLT-XXXX or CPLB-XXXX	SDTL-XXXX		
Casing size (in.)	7 to 7-5/8		9-5/8 to 24		9-5/8, 11-3/4, 13-3/8, and 16		9-5/8 to 24		9-5/8 to 24		7 to 7-5/8	9-5/8 to 13-3/8	7 to 7-5/8			9-5/8 to 16		4 to 24	3-1/2 to 24	7, 9-5/8, 11-3/4, 13-3/8, and 16		2-7/8 to 4	4-1/2 to 5-1/2	4-1/2 to 6-5/8 (4 sizes)	
Color coding (product stickers and dart labels)	Blue		Green		Green		Red		Blue	Green	Blue			Green		N/A				N/A	N/A				
Complete landing string minimum drift (in./mm)	2.17 55.1		2.54 64.5		2.54 64.5		2.88 73.2		2.17 55.1	2.54 64.5	2.17 55.1			2.54 64.5		Depending on plug size				2.01 51.1	3.48 88.4	2.42 61.5			
Minimum plug set bore ID (in./mm)	1.78 45.2		2.11 53.6		2.20 55.9		1.66 42.2		2.41 61.2	1.78 45.2	2.11 53.6	1.81 46.0			2.01 51.1	2.25 57.2	Depending on plug size				N/A		N/A		
Trip ball size (through plug system, in./mm)	1.50 38.1		2.00 50.8		2.00 50.8		1.50 38.1		2.25 57.2	1.50 38.1	2.00 50.8	1.75 44.5			1.875 47.625	2.125 53.975	N/A				N/A		N/A		
Integral ball seat	N/A		N/A		N/A		N/A		N/A	N/A	N/A			Yes	No	N/A				N/A		N/A			
Activation ball (in./mm)	N/A		N/A		N/A		N/A		N/A	N/A	N/A			2.125 53.975	N/A	N/A				N/A		N/A			
Bottom plug rupture disc/tube ratings (psi/MPa)	1,000 6.89		1,000 6.89		1,000 6.89		1,000 6.89		N/A	N/A	N/A			N/A		400 to 1,000 2.76 to 6.89				1,000 6.89	750 to 6,000 5.17 to 41.37	N/A			
Maximum circulating temperature rating (*F/*C)	257 125		257 125		257 125		257 125		257 125	257 125	257 125			257 125		293 145				395 202		257 125			
Maximum temperature for bump pressure ratings (*F/*C)	350 177		350 177		350 177		350 177		302 150	302 150	350 177			350 177		392 200				395 202		395 202			
Mechanical ball seat (MBS) compatible	Yes, 7-in. MBS		Yes, 9 5/8-in. MBS		Yes, 9 5/8-in. MBS		Yes, 9 5/8-in. MBS		Yes, 7-in. MBS	Yes, 9 5/8-in. MBS	Yes, 7-in. MBS			No	Yes, 9-5/8 MBS	No				No		No			
Plug landing profile	Latch-in	WiperLok [®]	WiperLok	Standard flat	WiperLok	WiperLok	WiperLok	WiperLok	Standard flat	Nonrotating	Nonrotating	Latch-in	WiperLok	Standard flat	WiperLok	WiperLok	Standard flat	WiperLok	Standard flat	WiperLok	Standard flat	Latch-in	Latch-in		
Compatible darts/balls	Top-plug activation	SSR-SB top dart		SSR-MB top dart				SSR-LB top dart		SSR-SB top dart	SSR-MB top dart	SSR-SB top dart			SSR-MB top dart		N/A				N/A		N/A		
	Bottom-plug activation	SSR-SB bottom dart		SSR-MB bottom dart				2 1/4-in. ball	1 3/4-in. ball	SSR-LB bottom dart		SSR-SB bottom dart	SSR-MB bottom dart	N/A			N/A		N/A				N/A		N/A
Compatible landing collars/baffle plate	WLCD	507N, 502P	507N, 502P	502, 507N, 507P	507N, 502P		507N, 502P	502, 507N, 507P	754PD	754PD	WLCD	507N, 502P	502, 507N, 507P	507N, 502P		507N, 502P	502, 507N, 507P	507N, 502P	502, 507N, 507P	507N, 502P	502, 507N, 507P	5E4L		502-1L	
Compatible float collars for landing plugs ^d	N/A	402P/NP, M45AP, 455P/NP	402P/NP, 402PH, L45WP/AP, L42W/A, L47W/A, 455P/NP	402 / E402, L45W/A, L42W/A, L47W/A, 455, 456	402P/NP, 402PH, L45WP/AP, L42W/A, L47W/A, 455P/NP		402P/NP, 402PH, L45WP/AP, L42W/A, L47W/A, 455P/NP	402, E402, L42W/A, L47W/A, 455, 456	N/A	N/A	N/A	402P/NP, 402PH, M45AP, M42A, M47A, 455P/NP	402, E402, M45A, M42A, M47A, 455, 456	402P/NP, 402PH, L45WP/AP, L42W/A, L47W/A, 455P/NP		402P/NP, 402PH, 402EP, L45WP/AP, L42W/A, L47W/A, M45AP, M42A, M47A, 455P/NP	402, E402, L45W/A, L42W/A, L47W/A, M45A, M42A, M47A, 455, 456	402P/NP, 402PH, 402EP, L45WP/AP, L42W/A, L47W/A, M45AP, M42A, M47A, 455P/NP	402, E402, L45W/A, L42W/A, L47W/A, M45A, M42A, M47A, 455, 456	402, E402, L45W/A, L42W/A, L47W/A, M45A, M42A, M47A, 455, 456	402, E402, L45W/A, L42W/A, L47W/A, M45A, M42A, M47A, 455, 456	4E2HL	4E2EL, 4E2HL, 4E2L	371, 303-1L/2L, 323-1L/2L, 313-1L/2L, 402-1L, 402-2L	

^aTemperatures and fluids affect plug performance. To select the appropriate cement plug system for your application, please contact a Weatherford representative.
^bThis number is for internal use only. The four X's in the model number stand for the compatible casing size. For example, 0700 denotes a plug compatible with 7-in. casing.
^cContact a Weatherford customer service representative for more information.
^dNot all compatible float collars and shoes are shown. Weatherford elastomer plugs with standard flat-landing profiles can also be landed on landing collars or float collars with WiperLok landing plates.



Subsurface- Release Plugs

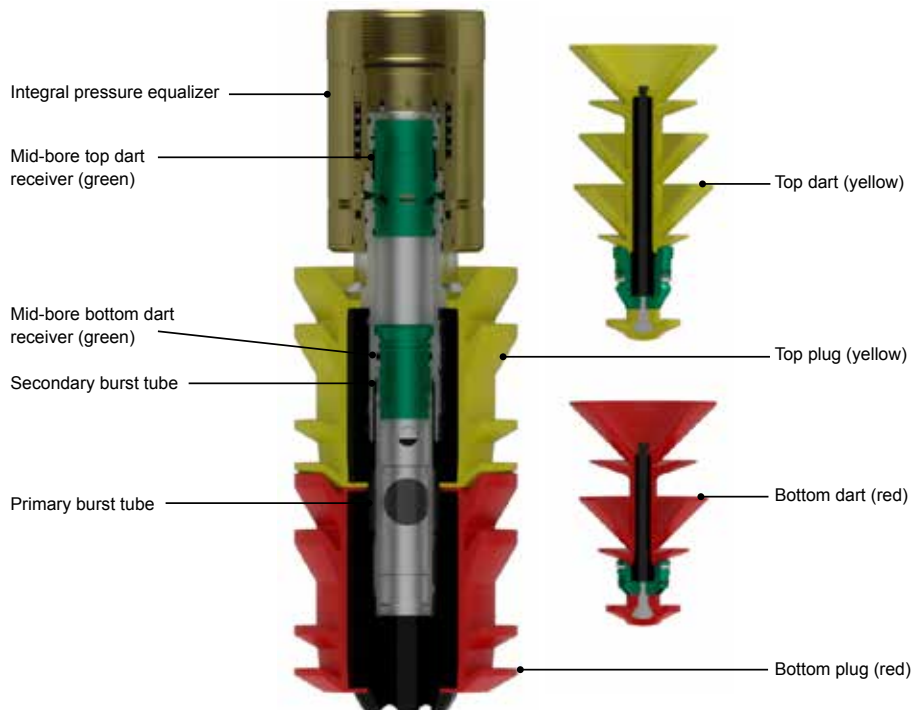
Sub-Surface Release™ Plug Systems

Weatherford's *Sub-Surface Release* plug systems are run with subsea casing or liner-hanger systems to separate fluids while cementing. The darts separate fluids in the drillpipe or landing string and then activate the releasing mechanism in the plug. The plugs, available in both single- and dual-plug designs, maintain fluid separation throughout the casing. The top and bottom darts which are used to activate and launch the plugs, vary from one type of system to another. To ensure use of the proper darts with the proper plugs, each plug system uses a specific color-code: red for large-bore systems, green for mid-bore systems and blue for small-bore systems. Additionally, within each system, all top and bottom darts and plugs are color coordinated to ensure the proper loading and releasing sequence. Top darts and plugs are yellow; bottom darts and plugs are red.

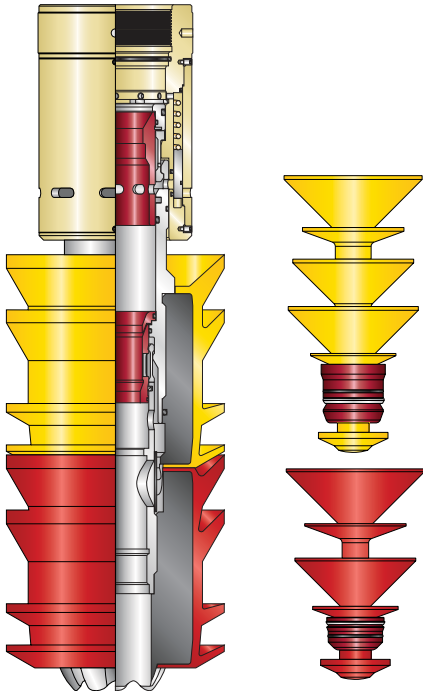
The bottom dart is pumped from the surface in front of cement slurry and latches into the bottom plug. The bottom plug releases and features a rupture disk that enables circulation to be re-established after the wiper plug lands on the float equipment. The top dart is pumped behind the cement slurry and lands in the top plug. After the top plug is released, it wipes the casing before bumping on top of the bottom plug, providing a positive indication of cement displacement.

The plug systems are designed for use with Weatherford's autofill float equipment and SurgeMaster™ diverter tools, which are run to reduce surge pressures and increase running speeds. The *SurgeMaster* tool helps get pipe in the hole faster, and the wiping efficiency of the plugs ensures clean casing ID and good-quality cement behind pipe. All plugs and darts are functionally compatible with casing and liner-hanger systems across the industry as well as all cementing-pumping service operations.

- Large rupture disks in the bottom plug minimize risk of plugging with solids or debris to ensure system reliability.
- Polyurethane plug fins offer superior abrasion resistance and excellent wiping action, resulting in a clean casing ID after passage.
- Patented, integral swivel pressure-equalizer prevents pressure buildup above the plugs to prevent premature release and enables rotation of the running string without rotation of the plugs.
- Should both top and bottom plugs release simultaneously, an internal bypass feature enables fluid to flow through the plugs when they land to complete the cement job.



Sub-Surface Release™ Large-Bore Plug System For Casing and Liner Sizes 9 5/8 in. to 24 in.



Weatherford's industry-standard *Sub-Surface Release* large-bore plug system is particularly advantageous in close-tolerance casing programs. It is run in conjunction with 9 5/8- to 24-in. subsea casing hanger or liner hanger systems where the minimum drift of the running string is 2.88 in. The plug system is specifically designed with a 2.41-in. bore inside the plugs to enable the passage of 2 1/4-in. trip balls, improve fluid-flow capacity, and reduce surge pressures on weak formations when combined with Weatherford's autofill float equipment. The patented, integral pressure-equalizer prevents pressure buildup above the plugs to prevent premature release.

The large-bore bottom dart is pumped from the surface in front of cement slurry and latches into the bottom plug. The bottom plug releases and features a rupture disk that enables circulation to be re-established after the wiper plug lands on the float equipment. The large-bore top dart is pumped behind the cement slurry and lands in the top plug. After the top plug is released, it wipes the casing before bumping on the top of the bottom plug, providing a positive indication of cement displacement.

In the unlikely event that the top and bottom plugs release simultaneously, the integral emergency-bypass feature enables fluid to bypass the plug set and flow into the shoe track, ensuring continuation of cement displacement.

Dramatically reducing drillout and running-in-the-hole time, the *Sub-Surface Release* large-bore plugs feature a Wiperlok® nonrotating profile that corresponds to equivalent nonrotating landing profiles of compatible Weatherford float equipment. The plugs are primarily constructed from polyurethane and are available in either standard or combination fin designs.

Applications

- Any liner requiring a dual-plug system configuration to provide fluid separation during cementing operations
- Tight-tolerance liners that require the largest possible bore through the running string
- Especially beneficial when radial clearance between casing strings is less than or equal to 0.125 in.
- Compatible and recommended for use with Weatherford's Sure-Seal™ 3 and 402/P/NP autofill equipment
- Liners run in pressure-sensitive formations

Sub-Surface Release™ Large-Bore Plug System For Casing and Liner Sizes 9-5/8 in. to 24 in.

Features, Advantages and Benefits

- The large-bore plug system reduces surge pressures while running casing or a liner with autofill equipment in close tolerance annuli, protecting sensitive formations from surge pressures that can cause mud losses and ultimately saving time and rig costs.
- The patented, integrated pressure-equalizer prevents pressure buildup above the plugs to prevent premature release and enables rotation of the running string without rotation of the plugs, preventing fin damage on the plugs.
- The 2.41-in. large-bore enables the passage of 2 1/4-in. trip balls to pass through, activating float equipment below the plug. For float equipment requiring a smaller (2-in.) trip ball activation, see Weatherford's *Sub-Surface Release* mid-bore plug system.
- Two large 1.97-in. (50-mm) rupture disks in the bottom plug minimize risk of plugging with solids or debris, ensuring system reliability.
- In the event that the dual plugs are released simultaneously by the bottom dart, the integral emergency-bypass feature enables fluid to bypass the plug set and flow into the shoe track, ensuring continued cement displacement.
- Plugs are released by darts that maintain fluid separation through the drillpipe, preventing cement contamination.
- The system is PDC (polycrystalline diamond composite) drillable with a Wiperlok® nonrotation profile that prevents rotation of the plugs during drillout of the float equipment, simplifying drillout and saving rig time.
- Polyurethane plug fins offer superior abrasion resistance and excellent wiping action, resulting in a clean casing ID after passage.

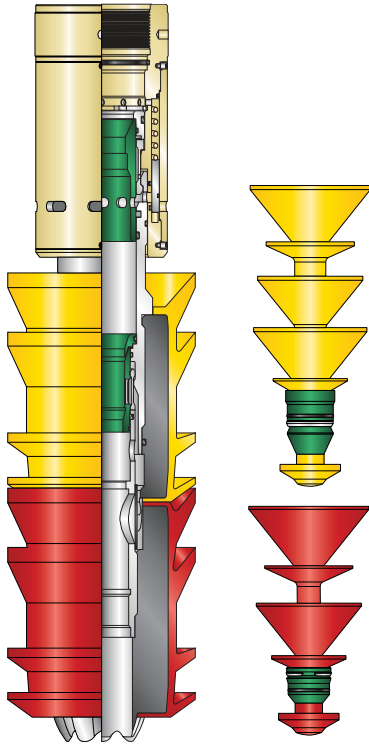
Specifications

Plug size (in./mm)	9-5/8 244.5	10-3/4 to 11-3/4 273.1 to 298.5	13-3/4 to 14 349.3 to 355.6	16 to 24 406.4 to 609.6
Maximum plug-bump pressure (psi/MPa)	6,000 41.37	5,500 37.92	5,000 34.47	3,000 20.68
Bottom-plug launch pressure (psi/MPa)	800 to 1,200 5.516 to 8.274			
Top-plug launch pressure (psi/MPa)	High pressure	2,000 to 2,500 13.790 to 17.237		
	Low pressure	800 to 1,200 5.516 to 8.274		
Minimum plug ID (in./mm)	2.41 61.21			
Minimum flow area (in. ² /mm ²)	4.56 2,941			
Maximum rigid-dart diameter (in./mm)	2.84 72.14			
Minimum pump-through drift diameter for dart (in./mm)	2.88 73.2			
Flow endurance (bbl/min)	27 for 4 hr/18 for 16 hr			
Maximum circulating temperature rating (°F/°C)	257 125			
Maximum temperature for bump pressure rating (°F/°C)	257 125			
Pressure required to open equalizer (psi/MPa)	30 to 60 0.21 to 0.41			

Options

- Plug sets are available in standard or combination plug fin designs.
- Top plug available for high- or low-pressure applications.
- Optional ball catcher enables a 1 1/2- to 2-in. setting ball to be caught and retained in the bottom plug.

Sub-Surface Release™ Mid-Bore Plug System For Casing and Liner Sizes 9-5/8 in. to 24 in.



Weatherford's industry-standard *Sub-Surface Release* mid-bore plug system is run in conjunction with 9 5/8- to 24-in. subsea casing hanger or liner hanger systems where the minimum drift of the running string is 2.54 in. The plug system is specifically designed with a 2.11-in. mid-bore inside the plugs to enable the passage of 2-in. trip balls, improve fluid-flow capacity, and reduce surge pressures on weak formations when combined with Weatherford's autofill float equipment. The patented, integral pressure-equalizer prevents pressure buildup above the plugs to prevent premature release.

The mid-bore bottom dart is pumped from the surface in front of cement slurry and latches into the bottom plug. The bottom plug releases and features a rupture disk that enables circulation to be re-established after the wiper plug lands on the float equipment. The mid-bore top dart is pumped behind the cement slurry and lands in the top plug. After the top plug is released, it wipes the casing before bumping on the top of the bottom plug, providing a positive indication of cement displacement.

In the unlikely event that the top and bottom plugs are released simultaneously, the integral emergency-bypass feature enables fluid to bypass the plug set and flow into the shoe track, ensuring continuation of cement displacement.

Dramatically reducing drillout and running-in-the-hole time, the *Sub-Surface Release* mid-bore plugs feature a Wiperlok® nonrotating profile that corresponds to equivalent nonrotating landing profiles of compatible Weatherford float equipment. The plugs are primarily constructed from polyurethane and are available in either standard or combination fin designs.

Applications

- Any liner requiring a dual-plug-system configuration to provide fluid separation during cementing operations
- Tight-tolerance liners that require a large bore through the running string
- Compatible and recommended for use with Weatherford's Sure-Seal™ 3 and 402/P/NP autofill equipment
- Liners run in pressure-sensitive formations

Sub-Surface Release™ Mid-Bore Plug System For Casing and Liner Sizes 9-5/8 in. to 24 in.

Features, Advantages and Benefits

- The mid-bore plug system reduces surge pressures while running casing or a liner with autofill equipment in close-tolerance annuli, protecting sensitive formations from surge pressures that can cause mud losses and ultimately saving time and rig costs.
- The patented, integrated pressure-equalizer prevents pressure buildup above the plugs to prevent premature release and enables rotation of the running string without rotation of the plugs, preventing damage of the fins on the plugs.
- The 2.11-in. bore enables 2-in. trip balls to pass through, activating float equipment below the plug. For float equipment requiring larger (2-1/4 in.) trip ball activation, see Weatherford's *Sub-Surface Release* large-bore plug system.
- Two large 1.97-in. (50-mm) rupture disks in the bottom plug minimize risk of plugging with solids or debris, ensuring system reliability.
- In the event that the dual plugs are released simultaneously by the bottom dart, the integral emergency-bypass feature enables fluid to bypass the plug set and flow into the shoe track, ensuring continued cement displacement.
- Plugs are released by darts that maintain fluid separation through the drillpipe, preventing cement contamination.
- The system is PDC (polycrystalline diamond composite) drillable with a Wiperlok® nonrotating profile that prevents rotation of the plugs during drillout of the float equipment, simplifying drillout and saving rig time.
- Polyurethane plug fins offer superior abrasion resistance and excellent wiping action, resulting in a clean casing ID after passage.

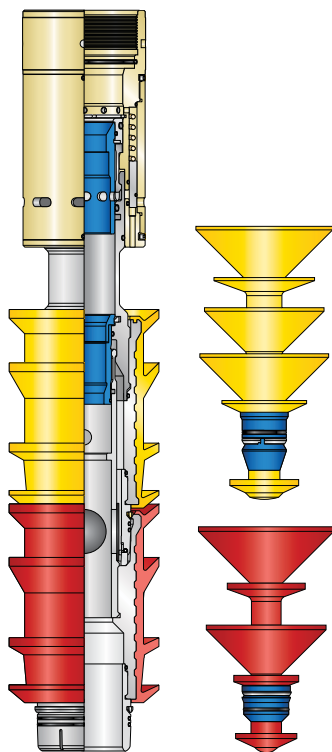
Specifications

Plug size (in./mm)	9-5/8 244.5	10-3/4 to 11-3/4 273.1 to 298.57	13-3/8 to 14 339.7 to 355.6	16 to 24 406.4 to 609.6
Maximum plug-bump pressure (psi/MPa)	6,500 44.82	6,000 41.37	5,500 37.92	3,000 20.68
Bottom plug launch pressure (psi/MPa)	800 to 1,200 5.516 to 8.274			
Top plug-launch pressure (psi/MPa)	High pressure		2,000 to 2,500 13.790 to 17.237	
	Low pressure		800 to 1,200 5.516 to 8.274	
Minimum plug ID (in./mm)	2.11 53.59			
Minimum flow area (in. ² /mm ²)	3.48 2,245			
Maximum rigid-dart diameter (in./mm)	2.492 63.30			
Minimum pump-through drift diameter for dart (in./mm)	2.54 64.5			
Flow endurance (bbl/min)	24 for 4 hr/18 for 16 hr			
Maximum circulating temperature rating (°F/°C)	257 125			
Maximum temperature for bump pressure rating (°F/°C)	257 125			
Pressure required to open equalizer (psi/MPa)	30 to 60 0.21 to 0.41			

Options

- Plug sets are available in standard or combination plug fin designs.
- Top plug available for high- or low-pressure applications.
- Optional ball catcher enables a 1 1/2- to 2-in. setting ball to be caught and retained in the bottom plug.

Sub-Surface Release™ Small-Bore Plug System For Casing and Liner Sizes 7 in. to 7-5/8 in.



Sub-Surface Release small-bore plug system with latch-in, nonrotating profile

Weatherford's industry-standard *Sub-Surface Release* small-bore plug system is designed for subsea casing hangers or hydraulic liner systems between 7 in. (177.8 mm) and 7-5/8 in. (193.7 mm) where the minimum drillstring drift is 2.17 in. (55.1 mm). The bore inside the plugs improves fluid-flow capacity and, when combined with Weatherford's autofill float valves, reduces surge pressure on weak formations as the system is running in the hole. The patented, integral pressure-equalizer prevents pressure buildup above the plugs to prevent premature release.

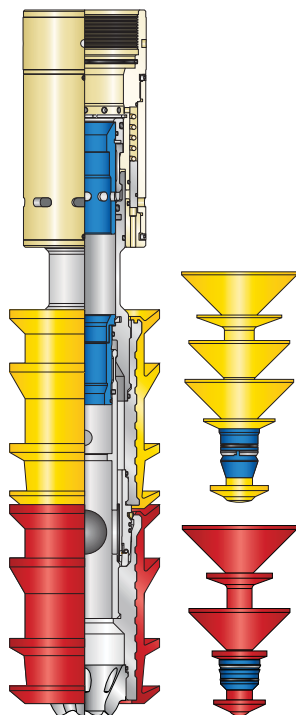
The small-bore plug system is fully compatible with Weatherford's mechanical ball seat (MBS). When a setting ball lands in the seat, applied surface pressure facilitates setting the hydraulic hanger and shears the ball seat. The bottom dart is pumped from the surface in front of cement slurry and latches into the bottom plug. The bottom plug releases and features a rupture disk that enables circulation to be re-established after the wiper plug lands in the landing or float collar. The top dart is pumped behind the cement slurry and lands in the top plug. After the top plug is released, it wipes the casing before bumping on the top of the bottom plug, providing a positive indication of cement displacement.

In the unlikely event that the top and bottom plugs leave simultaneously, the integral emergency-bypass feature enables fluid to bypass the plug set and flow into the shoe track, ensuring continuation of cement displacement.

The system can be used with Weatherford's autofill float equipment to dramatically reduce drillout and running-in-the-hole time. The plugs are available in a latch-in, nonrotating profile or a Wiperlok® nonrotating profile that corresponds to the compatible WLCD landing collar or 402P/ NP float collar. The plugs are primarily constructed from polyurethane and are available in either standard or combination fin designs.

Applications

- Any liner for which a dual wiper-plug system is required to provide separation of fluids during the cementing operations
- Liners run with close-tolerance annuli
- Liners run in pressure-sensitive formations
- Latch-in configuration is compatible and recommended for use with Weatherford's WLCD landing collar and autofill float equipment
- *Wiperlok* configuration is compatible and recommended for use with Weatherford's 402P/NP float collars and autofill float equipment



Sub-Surface Release small-bore plug system with *Wiperlok* nonrotating profile

Sub-Surface Release™ Small-Bore Plug System For Casing and Liner Sizes 7 in. to 7-5/8 in.

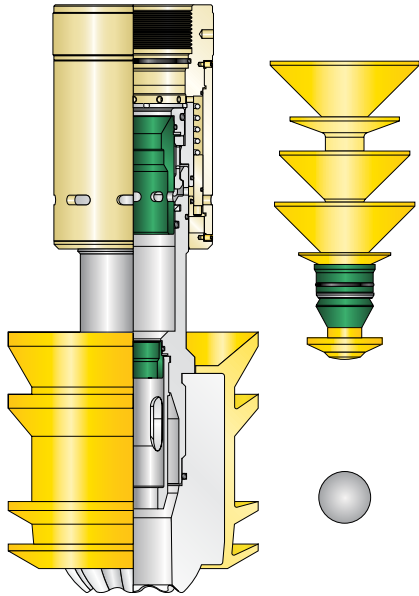
Features, Advantages and Benefits

- The dual plugs are released by darts that maintain fluid separation through the drillpipe, preventing cement contamination.
- The patented, integrated pressure-equalizer prevents pressure buildup above the plugs to prevent premature release and enables rotation of the running string without rotating the plugs in the casing, thereby preventing damage to the plug fins.
- Polyurethane plug fins offer superior abrasion resistance and excellent wiping action, resulting in a clean casing ID after passage.
- The system is PDC (polycrystalline diamond composite) drillable with a latch-in, nonrotating profile or Wiperlok® nonrotating profile to prevent rotation of the plugs during drillout of the landing or float collar, simplifying drillout and saving rig time.
- Two large rupture disks in the bottom plug minimize risk of plugging with solids or debris, ensuring system reliability.
- Fully compatible with Weatherford's MBS to eliminate the need of a ball seat within the plugs and unnecessary equipment below the landing or float collar, improving operational efficiency and reducing cost.
- The 1.78-in. (45.21-mm) bore enables the passage of 1.5-in. (38.1-mm) trip balls to pass through, activating float equipment below the plug.
- In the event that the dual plugs are released simultaneously by the bottom dart, the integral emergency bypass feature enables fluid to bypass the plug set and flow into the shoe track, ensuring continued cement displacement.

Specifications

Plug size (in./mm)	7 177.8	7 × 7-5/8 177.8 × 193.7	7 × 8-5/8 177.8 × 219.1	7 × 9-5/8 177.8 × 244.5	7-5/8 193.7	7-5/8 × 8-5/8 193.7 × 219.7	7-5/8 × 9-5/8 177.8 × 244.5
Maximum plug-bump pressure (psi/MPa)	8,000 55.16						
Maximum plugback pressure (psi/MPa)	3,000 20.68						
Top plug-launch pressure (psi/MPa)	High pressure		2,000 to 2,500 13.790 to 17.237				
	Low pressure		800 to 1,200 5.516 to 8.274				
Bottom plug-launch pressure (psi/MPa)	800 to 1,200 5.52 to 8.27						
Minimum plug ID (in./mm)	1.78 45.21						
Minimum flow area (in. ² /mm ²)	2.49 1,606						
Maximum rigid-dart diameter (in./mm)	2.13 54						
Minimum pump-through drift diameter (in./mm)	2.17 55						
Flow endurance (bbl/min)	10 for 24 hr/14 for 4 hr						
Maximum circulating temperature rating (°F/°C)	257 125						
Maximum temperature for bump pressure rating (°F/°C)	350 177						
Equalizer actuation pressure (psi/MPa)	50 to 100 0.34 to 0.69						

Model 837BC Sub-Surface Release™ Top Plug System For Liner Sizes 9-5/8 in. to 16 in.



Weatherford's industry-standard Model 837BC *Sub-Surface Release* top plug system is a premium cementing plug that incorporates a ball seat for mid-diameter liners. The plug is designed for use with 9 5/8-in. and larger hydraulic liner systems, where the minimum drift of the drillstring is 2.54 in. (64.5 mm).

This plug performs multiple functions during liner-setting and cementing operations. When the setting ball lands in the seat, applied surface pressure facilitates setting the hydraulic hanger and releasing the hydraulically released running tool. During the cementing job, the plug separates the top of the cement column from the displacement fluid, preventing cement contamination and confirming cement displacement when the plug lands on the float or landing collar at the liner bottom.

The Model 837BC *Sub-Surface Release* top plug system features a patented integral-pressure equalizer to prevent premature release. It also has a more reliable shear-ring ball seat and plug-launch design, resulting in more accurate shear-pressure activation.

When run on the outer joints connected to the retrievable seal mandrel (RSM) packoff, the plug does not move when picking up the setting tool, thus confirming release from the hanger system. This feature prevents damage to, or accidental release of, the plug and is a proprietary design advantage of the Weatherford liner-hanger system.

Applications

- Liners run in pressure-sensitive formations
- Compatible and recommended for use with Weatherford's SurgeMaster™ II and large-bore autofill float equipment
- Liners run with close-tolerance annuli
- Wells in which it is advantageous to have the ball seat in the plug rather than at the shoe

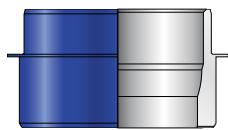
Model 837BC Sub-Surface Release™ Top Plug System For Liner Sizes 9-5/8 in. to 16 in.

Features, Advantages and Benefits

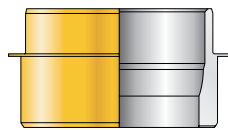
- The integral ball seat provides the capability to actuate hydraulically functioned equipment above the plug rather than pressuring up the complete casing string, providing greater operational efficiency.
- The ball seat retains the setting ball after shearing, eliminating the need for a separate ball-catching device, thereby reducing costs.
- The Model 837BC *Sub-Surface Release* top plug system relieves surge pressures while running a liner with autofill-float equipment in close-tolerance annuli, ultimately saving time and rig costs by protecting sensitive formations from surge pressures, which can cause mud loss.
- The patented, integral pressure-equalizer system prevents pressure buildup above the plug, thereby preventing premature release.
- The mid-bore dart releases the plug to maintain fluid separation of cement and displacement fluid through the drillpipe, preventing cement contamination.
- The 2.343-in. (59.51-mm) bore enables 2.125-in. (53.98-mm) trip balls to pass through, activating equipment below the plug, such as the float equipment.
- When the integral ball seat is sheared, the pressure dissipates in the liner, greatly reducing the possibility of formation damage related to hydraulic shock.
- Polyurethane plug fins offer superior abrasion resistance and case-wiping action, resulting in a cleaner casing ID than conventional plugs.
- The plug is PDC (polycrystalline diamond composite) drillable, which eliminates the need to trip in and out of the hole to remove the plug, saving operating costs and rig time.
- The exclusive WiperLok® nonrotating system's selective use of the compatible Weatherford float collar or landing collar prevents the plug from rotating during drillout, thereby reducing rig time.
- If the plug does not release as planned, a bypass feature located in the crossover above the plug enables the plug to be released and cement to be displaced from the liner.

Ball Seat

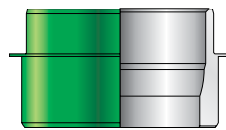
Ball seats can catch 2 1/8-in. balls and come in four different shear pressures that are color-coded for easy identification: 1,600 psi (11.03 MPa) blue, 2,500 psi (17.24 MPa) yellow, 3,000 psi (20.68 MPa) green, and 3,500 psi (24.13 MPa) red.



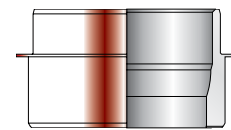
1,600 psi (11.03 MPa)



2,500 psi (17.24 MPa)



3,000 psi (20.68 MPa)



3,500 psi (24.13 MPa)

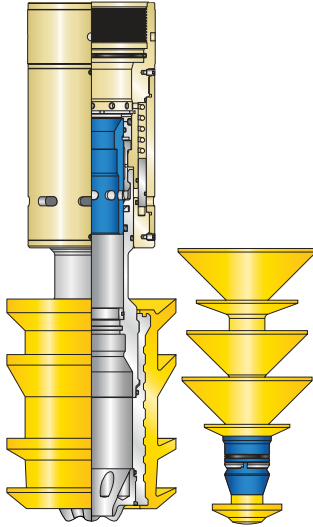
Specifications

Plug size (in./mm)	9-5/8 244.5	10-3/4 to 11-3/4 273.1 to 298.5	13-3/8 to 14 339.7 to 355.6	16 406.4
Maximum bump pressure (psi/MPa)	6,500 44.81	6,000 40.37	5,500 37.92	3,000 20.68
Plug-launch pressure (psi/MPa)	2,000 to 2,500 13.79 to 17.24			
Blue ball seat shear pressure (psi/MPa)	1,600 11.03			
Yellow ball seat shear pressure (psi/MPa)	2,500 17.24			
Green ball seat shear pressure (psi/MPa)	3,000 20.68			
Red ball seat shear pressure (psi/MPa)	3,500 24.13			
Pressure required to open equalizer (psi/MPa)	30 to 60 0.21 to 0.41			
Minimum plug ID (in./mm)	2.343 59.51			
Minimum flow area (in. ² /mm ²)	3.19 2,058			
Maximum rigid-dart diameter (in./mm)	2.492 63.30			
Minimum pump-through drift diameter (in./mm)	2.540 64.52			
Maximum circulating temperature rating (°F/°C)	257 125			
Maximum temperature for bump pressure rating (°F/°C)	257 125			
Flow endurance before ball seat shear (bbl/min)	16 for 24 hr			
Flow endurance after ball seat shear (bbl/min)	16 for 4 hr			

Options

- Plug sets are available in standard or combination plug fin designs.
- Top plug available for high- or low-pressure applications.

Sub-Surface Release™ Small-Bore Top Plug For Casing and Liner Sizes 7 in. to 7-5/8 in.



Sub-Surface Release small-bore top plug with Wiperlok nonrotating profile

Weatherford's industry-standard *Sub-Surface Release* small-bore top plug is designed for use with subsea casing hangers or hydraulic liner systems between 7 in. (177.8 mm) and 7-5/8 in. (193.7 mm), where the minimum drift of the drillstring is 2.17 in. (55.1 mm). When combined with Weatherford's autofill float valves, the 1.81-in. (46.0-mm) bore inside the plug improves fluid-flow capacity and reduces surge pressure on weak formations as the system is running in the hole. The patented, integral pressure-equalizer prevents pressure buildup above the plug to prevent premature release.

The plug is fully compatible with Weatherford's mechanical ball seat (MBS). During the cement job, the plug separates the top of the cement column from the displacement fluid, preventing cement contamination and confirming cement displacement when the plug lands on the float or landing collar at the bottom of the liner.

The *Sub-Surface Release* small-bore top plug can be used with Weatherford's autofill float equipment to reduce drillout and running-in-the-hole time. The plug is available in a latch-in, Wiperlok®, or standard flat nonrotating profile that corresponds to the compatible WLCD landing collar or 402/NP float collar. The plug fins are primarily constructed from polyurethane and are available in either standard or combination designs.

Applications

- Any liner for which a single wiper-plug system is required to provide separation of fluids during cementing operations
- Liners run with close-tolerance annuli
- *Wiperlok* configuration is compatible and recommended for use with Weatherford's 402P/NP float collars and autofill float equipment
- Latch-in configuration is compatible and recommended for use with Weatherford's WLCD landing collar
- Liners run in pressure-sensitive formations
- Standard flat configuration is compatible and recommended for use with Weatherford's 402 float collar and autofill float equipment

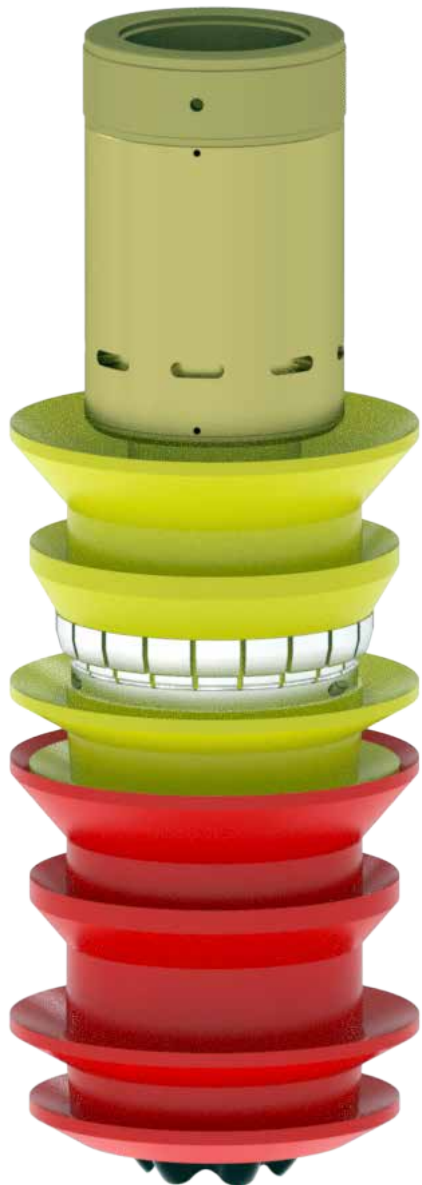
Features, Advantages and Benefits

- The top plug is released by the top dart, maintaining fluid separation through the drillpipe, preventing cement contamination.
- The patented, integrated pressure-equalizer prevents pressure buildup above the plug to prevent premature release and enables rotation of the running string without rotating the plug in the casing, preventing damage of the fins on the plug.
- Polyurethane plug fins offer superior abrasion resistance and excellent wiping action, resulting in a clean casing ID after passage.
- Fully compatible with Weatherford's MBS to eliminate the need of a ball seat within the plug and unnecessary equipment below the float collar, improving operational efficiency and reducing cost.
- The plug is PDC (polycrystalline diamond composite) drillable with a standard flat, latch in, or Wiperlok® nonrotating profile that prevents rotation of the plug during drillout of the float collar, simplifying drillout and saving rig time.
- The 1.81-in. (46.0-mm) bore enables the passage of 1.75-in. (44.4-mm) trip balls to pass through, activating float equipment below the plug.

Specifications

Plug size (in./mm)	7 177.8	7-5/8 193.7	7 × 7-5/8 177.8 × 193.7
Maximum plug-bump pressure (psi/MPa)	8,000 55.16		
Top plug-launch pressure (psi/MPa)	2,000 to 2,500 13.79 to 17.24		
Minimum plug ID (in./mm)	1.81 46		
Minimum flow area (in. ² /mm ²)	2.57 1,661		
Maximum rigid-dart diameter (in./mm)	2.13 54		
Minimum pump-through drift diameter for dart (in./mm)	2.17 55		
Flow endurance (bbl/min)	10 for 24 hr/14 for 4 hr		
Maximum circulating temperature rating (°F/°C)	257 125		
Maximum temperature for bump pressure rating (°F/°C)	350 177		
Equalizer actuation pressure (psi/MPa)	50 to 100 0.34 to 0.69		

Plug Locator System



Weatherford's plug locator system eliminates errors in cement-displacement volumes by producing a recognizable indication when a cementing top plug passes through a locator collar at a predetermined distance above the float or landing collar in the casing string.

A surface pressure increase between 300 and 900 psi (2.068 and 6.205 MPa) indicates when the top plug passes through the locator collar. Accurate displacement is achieved by pumping the calculated volume between the locator and landing collars until the top plug bumps.

The system meets the temperature and pressure ratings of Weatherford plugs equipped with polyurethane fins and Duromer cores.

Applications

- Long casing or liner strings using Weatherford's conventional or Sub-Surface Release™ plug systems
- Wells with compressible displacement fluids
- Critical well casing strings

Features, Advantages and Benefits

- The system eliminates most errors in cement displacement volumes, such as fluid compression, casing ID variances, and incorrect pump efficiencies, preventing costly corrective measures.
- The system prevents a wet shoe and excessive cement drillout.
- The locator collar and plug are PDC (polycrystalline diamond composite) drillable, saving valuable rig time.

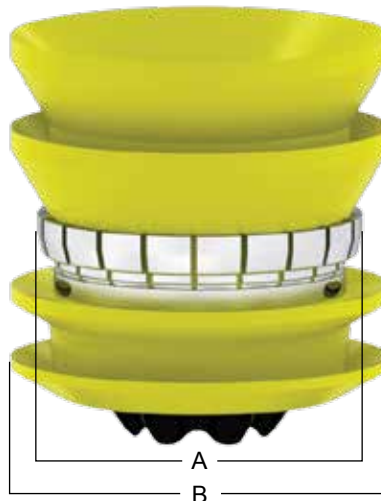
Specifications^a

Nominal Size (in./mm)	Indicator Pressure psi/MPa	Part Number	Dimensions			Minimum Pump-Through ID (in./mm)
			A (in./mm)	B (in./mm)	C (in./mm)	
7 177.8	300 to 900 2.068 to 6.205	1152936	5.74 145.8	6.69 169.9	5.63 143.0	5.90 149.9
9-5/8 244.5	300 to 900 2.068 to 6.205	917210	7.99 202.9	9.25 235.0	7.81 198.4	8.15 207.0
11-3/4 298.5	300 to 900 2.068 to 6.205	2148601	10.12 257.0	11.26 286.0	9.64 244.9	10.270 260.86
13-3/8 339.7	300 to 900 2.068 to 6.205	584598	12.09 307.1	13.11 333.0	11.82 300.2	12.25 311.15
16 406.4	300 to 900 2.068 to 6.205	2053367	14.01 355.9	15.87 403.1	13.78 350.0	14.220 361.19

^aThe plug locator system is only available in dual-plug sets.

Options

- The 7-in. (177.8-mm), 9 5/8-in. (244.5-mm), 11 3/4-in. (298.5-mm), 13 3/8-in. (339.7-mm), and 16-in. (406.4-mm) sizes are available with Weatherford's WiperLok® nonrotating profile for superior drillability when used with the WiperLok float shoes and collars.





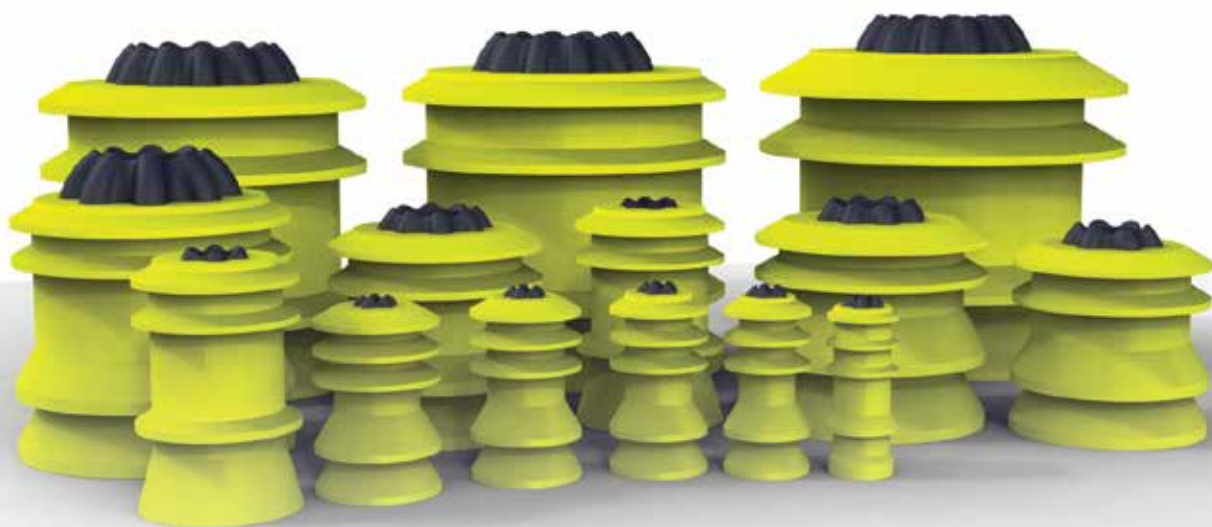
Surface- Release Plugs

Surface-Release Plug Systems

Weatherford's surface-release casing-wiper plugs are used for surface casing strings that require fluid separation during cementing operations. Released from Weatherford's cementing head, the bottom plug is launched in front of the cement slurry and features a rupture disk that enables circulation to be re-established after the plug lands on float equipment below. The top plug is then released, wiping the casing before bumping on the top of the bottom plug, providing a positive indication of cement displacement. A casing pressure test can then be performed to verify casing integrity.

Unique features of the systems include:

- Top and bottom plugs incorporate secondary sealing and wiping fins, reducing cement contamination by maintaining fluid separation.
- Standard plugs have a flat-bottom profile that forms a face-to-face seal, enabling high bump pressures.
- Nonrotating top and bottom plugs are available with WiperLok® nose design to prevent rotation of the plugs during drillout.
- Polyurethane plug fins offer superior abrasion and wear resistance, providing excellent wiping action, resulting in a clean casing ID after passage.
- One-piece Duromer core can withstand high torque, ensuring the device will not shear during drillout.



Surface-Release Casing-Wiper Plugs For Casing Sizes 3-1/2 in. to 24 in.



Weatherford's surface-release casing-wiper plugs are designed to efficiently wipe casing strings clean of cement while maintaining fluid separation during cementing operations. Designed and built using Weatherford's extensive field-proven experience in elastomer products, the wiper plugs are constructed primarily of high-abrasion, wear-resistant polyurethane to withstand high bump pressures and high-pressure casing tests.

Released from Weatherford's cementing head, the bottom plug is launched in front of the cement slurry and features a rupture disk that enables circulation to be re-established after the plug lands on float equipment below. The top plug is then released, wiping the casing before bumping on the top of the bottom plug, providing a positive indication of cement displacement. A casing pressure test can then be performed to verify proper zonal isolation.

The surface-release casing-wiper plugs are available in either standard flat or Wiperlok® nonrotating profiles. The plugs are compatible and recommended for use with Weatherford's float equipment to enhance pressure ratings and reduce surge pressures.

Applications

- Surface casing strings requiring fluid separation during cementing operations
- Deep, high-angle wellbores anticipating high displacement and bump pressures
- Compatible and recommended for use with Weatherford's Sure-Seal 3™ float equipment

Features, Advantages and Benefits

- Top and bottom plugs feature secondary sealing and wiping fins, reducing cement contamination by maintaining fluid separation.
- The bottom plug's integral rupture disk is rated at a 400-psi (2.75-MPa) burst pressure, with higher burst pressures available, providing operational flexibility for specific applications.
- Standard plugs feature a flat-bottom profile that forms a face-to-face seal, enabling high bump pressures.
- Nonrotating plugs feature Weatherford's Wiperlok® profile that prevents spinning and increases resistance to rotation as load is applied, producing significantly faster drillout times.
- Plugs are released from surface by Weatherford's cementing head, which uses a flag indicator to give a positive indication that the plugs have successfully launched from the head.
- Wiper plugs are PDC (polycrystalline diamond composite) drillable, saving rig time and avoiding bit damage.
- Polyurethane plug fins offer superior abrasion and wear resistance, providing excellent wiping action, resulting in a clean casing ID after passage.
- One-piece durometer core can withstand high torque, ensuring the device will not shear during drillout.

Options

- Plugs are available with standard or *Wiperlok* nonrotating profiles.
- Combination plugs are available for casing strings with multiple standard sizes.
- Higher pressure rupture disks are available upon request.

Wiper Plugs



Standard top plug



Nonrotating top plug



Standard bottom plug

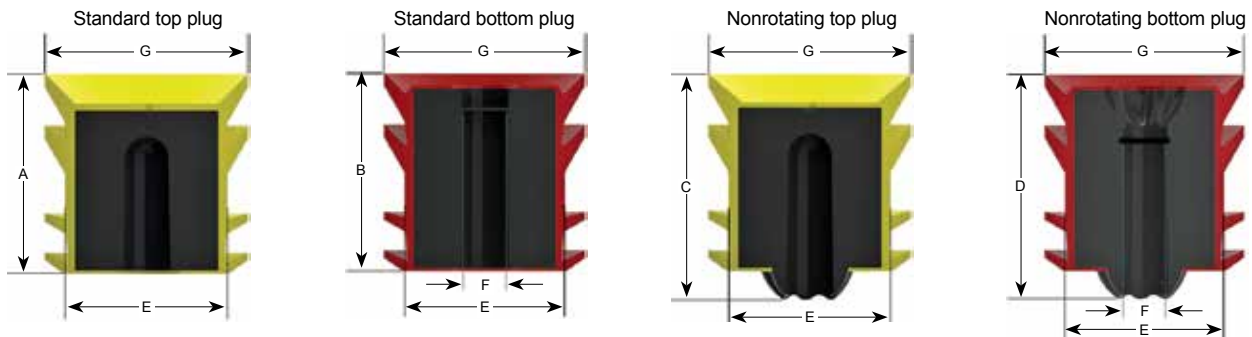


Nonrotating bottom plug

Surface-Release Casing-Wiper Plugs For Casing Sizes 3-1/2 in. to 24 in.

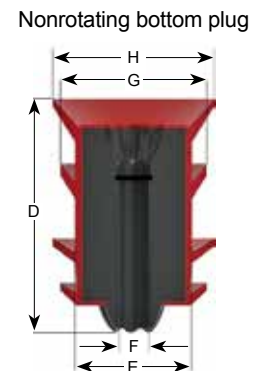
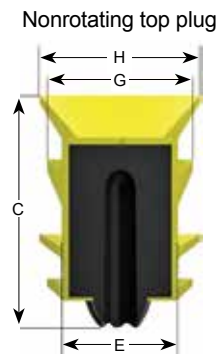
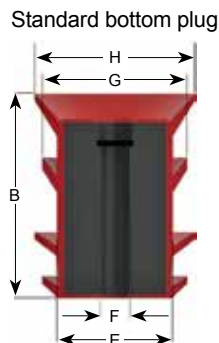
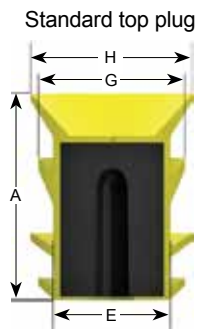
Specifications

Plug Size (in./mm)	Weight Range (lb/ft,kg/m)	Bump Pressure Rating (psi/MPa)	Minimum ID (in./mm)	Maximum ID (in./mm)	Number of Teeth	Dimensions						
						A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)	G (in./mm)
3-1/2 88.9	9.2 to 13.7 13.7 to 20.4	5,000 34.47	2.549 64.74	2.992 76.00	N/A	7.48 190	7.48 190	N/A	N/A	2.17 55	0.87 22	3.15 80
4 101.6	9.5 to 16.5 14.2 to 24.6	6,000 41.37	3.015 76.58	3.548 90.12	5	7.76 197	7.76 197	8.19 208	8.19 208	2.48 63	0.87 22	3.82 97
4-1/2 114.3	9.5 to 17.0 14.2 to 25.3	6,000 41.37	3.615 91.82	4.090 103.89	5	7.87 200	7.87 200	8.31 211	8.31 211	2.99 76	0.87 22	4.33 110
5 127.0	11.5 to 21.4 17.1 to 31.9	6,800 46.88	4.001 101.63	4.560 115.82	5	7.87 200	7.87 200	8.31 211	8.31 211	3.35 85	0.87 22	4.80 122
5-1/2 139.7	14.0 to 26.8 20.9 to 39.9	6,800 46.88	4.375 111.13	5.080 129.03	5	7.87 200	7.87 200	8.31 211	8.31 211	3.62 92	0.87 22	5.31 135
6-5/8 168.3	12.0 to 40.2 17.9 to 59.9	6,800 46.88	5.250 133.35	6.287 159.69	6	9.17 233	9.17 233	9.69 246	9.69 246	4.53 115	1.57 40	6.46 164
7 177.8	20.0 to 38.0 29.8 to 56.6	8,000 55.16	5.795 147.19	6.456 163.98	6	9.17 233	9.17 233	9.61 244	9.69 246	5.31 135	1.57 40	6.69 170
7-5/8 193.7	24.0 to 42.8 35.8 to 63.8	8,000 55.16	6.376 161.95	7.025 178.44	6	9.29 236	9.29 236	9.76 248	9.76 248	5.71 145	1.57 40	7.28 185
8-5/8 219.1	24.0 to 49.0 35.8 to 73.0	8,000 55.16	7.386 187.60	8.097 205.66	6	9.06 230	9.06 230	9.76 248	9.76 248	6.42 163	1.99 51	8.27 210
9-5/8 244.5	32.3 to 70.3 48.1 to 104.8	8,000 55.16	8.001 203.23	9.001 228.63	6	9.06 230	9.06 230	10.16 258	10.35 263	7.40 188	1.99 51	9.25 235
10-3/4 273.1	40.5 to 85.3 60.4 to 127.1	6,000 41.37	9.000 228.63	10.050 255.27	8	9.69 246	9.69 246	10.63 270	10.63 270	8.31 211	3.07 78	10.24 260
11-3/4 298.5	42.0 to 87.2 62.6 to 129.9	6,000 41.37	10.126 257.20	11.084 281.53	8	9.88 251	9.88 251	10.83 275	10.83 275	8.94 227	3.07 78	11.26 286
13-3/8 to 14 339.7 to 355.6	48.0 to 96.0 71.5 to 143.0 82.5 to 138.8 122.9 to 206.8	6,000 41.37	11.819 300.20	12.876 327.05	8	11.73 298	11.73 298	13.62 346	13.62 346	10.87 276	3.78 96	13.11 333
16 406.4	52.5 to 131.7 78.2 to 196.2	3,000 20.68	14.220 361.19	15.396 391.06	12	15.83 402	15.83 402	17.87 454	17.87 454	13.31 338	4.09 104	15.87 403
18 457.2	70.6 to 128.0 105.2 to 190.7	3,000 20.68	16.387 416.23	17.250 438.15	12	16.46 418	16.46 418	18.50 470	18.31 465	15.35 390	4.53 115	17.91 455
18-5/8 to 20 473.1 to 508.0	73.1 to 122.0 109.0 to 181.8 78.6 to 261.9 117.1 to 390.2	3,000 20.68	17.000 431.80	19.250 488.95	12	17.05 433	17.05 433	19.09 485	19.17 487	16.22 412	4.53 115	19.61 498
22 558.8	92.5 to 277.0 137.8 to 412.7	3,000 20.68	19.500 495.30	21.222 539.04	12	18.35 466	16.61 422	20.39 518	18.86 479	17.72 450	4.53 115	22.05 560
24 609.6	155.0 to 536.4 231.0 to 799.2	3,000 20.68	21.000 533.40	22.750 577.85	12	18.35 466	16.61 422	20.39 518	18.86 479	19.45 494	4.53 115	23.74 603



Combination Cement Plugs, 4-Fin Configuration

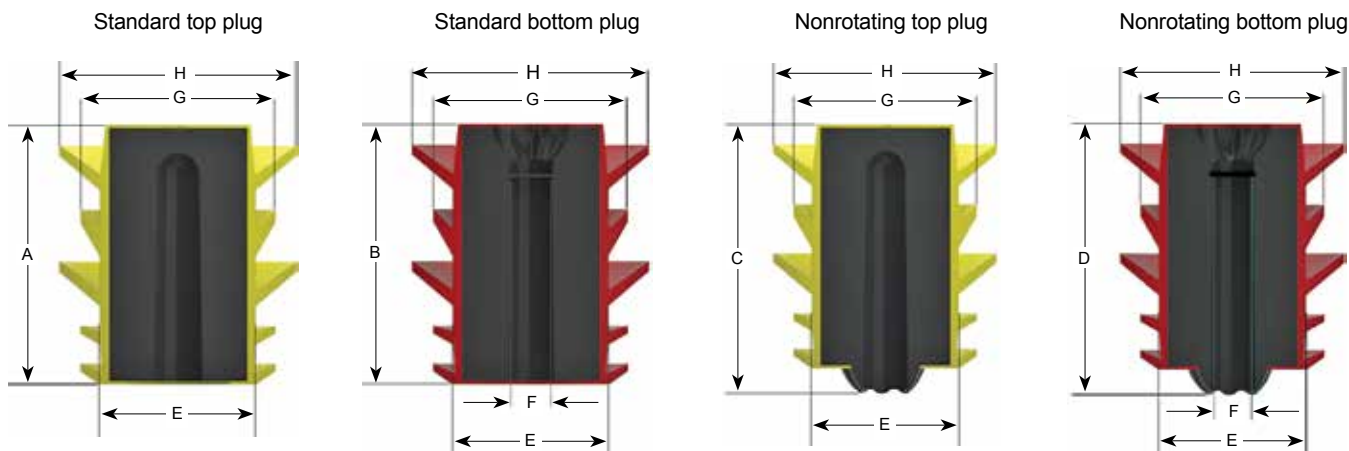
Size (in.) 1* x 2**	Weight Range 1* (lb/ft)	Weight Range 2** (lb/ft)	Bump Pressure Ratings (psi/MPa)	Minimum ID (in./mm)	Maximum ID (in./mm)	Number of Teeth	Dimensions							
							A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)	G (in./mm)	H (in./mm)
7 x 4-1/2	20.00 to 38.00	9.50 to 17.00	6,000 41.37	3.615 91.82	6.456 163.98	N/A	8.58 218	7.48 190	N/A	N/A	2.99 76	0.87 22.0	4.33 110	6.69 170
7 x 5	20.00 to 38.00	11.50 to 21.40	6,000 41.37	4.001 101.63	6.456 163.98	N/A	9.29 236	9.13 232	N/A	N/A	3.35 85	1.63 41.5	4.80 122	6.69 170
7-5/8 x 5	24.00 to 42.80	11.50 to 21.40	6,000 41.37	4.001 101.63	7.025 178.44	N/A	9.29 236	9.29 236	N/A	N/A	3.35 85	1.63 41.5	4.80 122	7.28 185
7 x 5-1/2	20.00 to 38.00	14.00 to 26.80	6,000 41.37	4.375 111.13	6.456 163.98	N/A	9.17 233	9.09 231	N/A	N/A	3.62 92	1.63 41.5	5.31 135	6.69 170
7-5/8 x 5-1/2	24.00 to 42.80	14.00 to 26.80	6,000 41.37	4.375 111.13	7.025 178.44	N/A	9.29 236	9.29 236	N/A	N/A	3.62 92	1.56 39.5	5.31 135	7.28 185
7 x 6-5/8	20.00 to 38.00	12.00 to 43.70	6,000 41.37	5.251 133.38	6.456 163.98	6	9.02 229	9.13 232	N/A	N/A	4.96 126	1.57 40.0	6.10 155	6.38 162
7-5/8 x 7	24.00 to 42.80	20.00 to 38.00	8,000 55.16	5.795 147.19	7.025 178.44	6	9.09 231	9.09 231	9.65 245	9.65 245	5.31 135	1.56 39.5	6.69 170	7.28 185
8-5/8 x 7	24.00 to 49.00	20.00 to 38.00	8,000 55.16	5.795 147.19	8.097 205.66	6	9.49 241	9.49 241	10.04 255	10.04 255	5.31 135	1.56 39.5	6.69 170	8.27 210
9-5/8 x 7	32.30 to 70.30	20.00 to 38.00	8,000 55.16	5.795 147.19	9.001 228.63	6	9.88 251	9.88 251	10.39 264	10.39 264	5.31 135	1.56 39.5	6.69 170	9.25 235
8-5/8 x 7-5/8	24.00 to 49.00	24.00 to 42.80	8,000 55.16	6.376 161.95	8.097 205.66	6	9.49 241	9.49 241	10.04 255	10.24 260	5.71 145	1.56 39.5	7.28 185	8.27 210
9-5/8 x 7-5/8	32.30 to 70.30	24.00 to 42.80	8,000 55.16	6.376 161.95	9.001 228.63	6	9.88 251	9.88 251	10.39 264	10.39 264	5.71 145	1.56 39.5	7.28 185	9.25 235
9-5/8 x 8-5/8	32.30 to 70.30	24.00 to 49.00	6,000 41.37	7.386 187.60	9.001 228.63	N/A	9.06 230	9.06 230	N/A	N/A	6.46 164	2.56 65.0	8.27 210	9.25 235
10-3/4 x 8-5/8	40.50 to 85.30	24.00 to 49.00	3,000 20.68	7.386 187.60	10.050 255.27	N/A	9.88 251	10.35 263	N/A	N/A	6.50 165	2.56 65.0	8.27 210	10.24 260
10-3/4 x 9-5/8	40.50 to 85.30	32.30 to 70.30	8,000 55.16	8.001 203.23	10.050 255.27	6	9.72 247	9.72 247	10.98 279	11.02 280	7.40 188	2.00 51.0	9.25 235	10.24 260
11-3/4 x 10-3/4	42.00 to 87.20	40.50 to 85.30	3,000 20.68	9.000 228.60	11.084 281.53	8	9.88 251	9.88 251	10.87 276	10.87 276	8.31 211	3.07 78.0	10.24 260	11.26 286



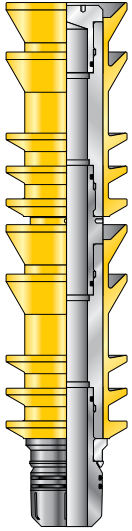
Surface-Release Casing-Wiper Plugs For Casing Sizes 3-1/2 in. to 24 in.

Combination Cement Plugs, 5-Fin Configuration

Size (in.) 1* x 2**	Weight Range 1* (lb/ft)	Weight Range 2** (lb/ft)	Bump Pressure Ratings (psi/MPa)	Minimum ID (in./mm)	Maximum ID (in./mm)	Number of Teeth	Dimensions							
							A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)	G (in./mm)	H (in./mm)
4-1/2 x 3-1/2	9.50 to 17.00	9.20 to 13.70	5,000 34.47	2.549 64.74	4.090 103.89	N/A	7.83 199	7.83 199	N/A	N/A	2.36 60	0.87 22	3.46 88	4.33 110
5-1/2 x 4-1/2	14.00 to 26.80	9.50 to 17.00	6,000 41.37	3.615 91.82	5.080 129.03	N/A	8.03 204	8.03 204	N/A	N/A	2.99 76	0.87 22	4.33 110	5.31 135
10-3/4 x 7	40.50 to 85.30	20.00 to 38.00	3,000 20.68	5.795 147.19	10.050 255.27	6	N/A	N/A	12.99 330	12.99 330	5.12 130	1.61 41	6.69 70	10.24 260
10-3/4 x 7-5/8	40.50 to 85.30	24.00 to 42.80	3,000 20.68	6.376 161.95	10.050 255.27	6	13.07 332	13.07 332	13.58 345	13.58 345	5.71 145	1.61 41	7.28 185	10.24 260
11-3/4 x 9-5/8	42.00 to 87.20	32.30 to 70.30	6,000 41.37	8.001 203.23	11.084 281.53	6	12.24 311	12.24 311	13.50 343	13.50 343	7.40 188	2.00 51	9.25 235	11.26 286
13-3/8 x 9-5/8	48.00 to 96.00	32.30 to 70.30	3,000 20.68	8.001 203.23	12.876 327.05	6	13.43 341	13.39 340	14.69 373	14.69 373	7.28 185	2.00 51	9.25 235	13.11 333
13-3/8 x 10-3/4	48.00 to 96.00	40.50 to 85.30	3,000 20.68	9.000 228.60	12.876 327.05	8	11.26 286	12.01 305	12.32 313	12.99 330	8.31 211	2.91 74	10.24 260	13.11 333
13-3/8 x 11-3/4	48.00 to 96.00	42.00 to 87.20	3,000 20.68	10.126 257.20	12.876 327.05	8	14.21 361	12.83 326	15.16 385	14.69 373	8.94 227	3.03 77	11.26 286	13.11 333
16 x 13-3/8	52.50 to 131.71	48.00 to 96.00	4,000 27.58	11.819 300.20	15.396 391.06	8	N/A	N/A	18.03 458	18.03 458	10.83 275	3.78 96	13.11 333	15.87 403
20 x 13-3/8	78.60 to 261.86	48.00 to 96.00	3,000 20.68	11.819 300.20	19.250 488.95	8	20.08 510	20.08 510	21.93 557	21.93 557	10.83 275	3.78 96	13.11 333	19.61 498



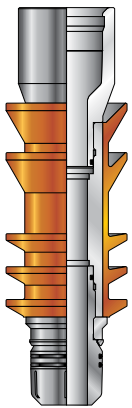
Multiple Latch-In Plug System High-Pressure Plugs for Tubing or Casing Sizes 2-7/8 in. to 5-1/2 in.



Weatherford's multiple latch-in plug system is a reliable, cost-effective method for using single or multiple high-pressure plugs to cement production tubing or completion strings. These plugs provide superior wiping ability, fluid separation, high-pressure plug bump, and backpressure capabilities for tubing or small-diameter casing in deep wells. Polyurethane plugs are used in wells with normal temperature gradients. For hot wells, the plugs are available in high-temperature versions using HNBR (hydrogenated nitrile butadiene rubber) material.

The wiping efficiency of the plug fins saves rig time by eliminating the need for cleanout trips or scraper runs before installing completion tools. Both top and bottom plugs latch and lock into a float or landing collar to provide backup to the float valves. When multiple plugs are used, the top plug latches and locks into the bottom plug. When latched in, the locking profile also stabilizes the plugs during drillout with PDC (polycrystalline diamond composite) bits.

Multiple-plug systems enhance the quality of the primary cement job by isolating the slurry and eliminating contamination. The bottom plug isolates preflushes and mud below from cement above. When the plug lands, increased pressure ruptures a disk, allowing displacement of the cement above. The top plug isolates displacement fluid above from the cement below and lands in the bottom plug when displacement is completed.

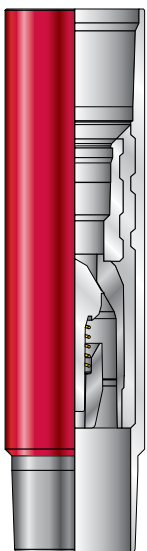


Applications

- Cemented completion strings using single or multiple plugs in wells with deep, small-diameter casing or tubing
- High-pressure cemented completions in which a backup to float equipment is beneficial
- Compatible and recommended for use with Weatherford's high-pressure Model 4E2EL or 4E2HL float collars or Model 5E4HL landing collars
- Cementing tubingless completions or conventional production casing with accessory tools that have restricted IDs such as a toe sleeve or X-type nipple

Features, Advantages and Benefits

- Plug fins provide superior abrasion resistance and wiping action, resulting in cleaner tubing that eliminates the need and time for a cleanout or scraper trip.
- Top and bottom plugs maintain fluid separation while pumping cement through tubing and casing, preventing cement contamination and ensuring a high-quality cement job.
- Bottom plugs have a large bypass-flow area, minimizing pressure drop and risk of plugging as cement circulates through the landing collar or shoe.
- The float or landing collars have a high backpressure rating and locking profile for pressure-holding redundancy and are quickly drilled out with PDC bits.
- Multiple plugs are stackable and stabilized with a latch-in design, enabling faster drillout times.



Multiple Latch-In Plug System High-Pressure Plugs for Tubing or Casing Sizes 2-7/8 in. to 5-1/2 in.

Specifications

Performance

Size (in./mm)	2-7/8 73.0	3-1/2 88.9	4 101.6	4-1/2 114.3	5 127.0	5-1/2 139.7
Maximum circulating temperature rating of polyurethane plug fins (°F/°C)	293 145					
Maximum temperature rating of polyurethane plugs for bump pressure rating (°F/°C)	392 200					
Maximum circulating temperature rating of HNBR plug fins (°F/°C)	N/A			350 176		
Maximum temperature rating of HNBR plugs for bump pressure rating (°F/°C)				392 200		
Bottom-plug rupture-disk shear pressure (psi/MPa)	750 to 6,000 5.17 to 41.37					
Minimum plug ID (in./mm)	0.85 21.6			1.50 38.1		
Minimum flow area (in. ² /mm ²)	0.56 361			1.76 1,135		
Maximum casing ID (in./mm)	2.441 62.00	2.992 75.80	3.548 90.12	4.090 103.89	4.560 115.82	5.080 129.03
Minimum pump-through drift diameter (in./mm)	2.151 54.64	2.548 64.72	3.015 76.59	3.615 91.82	4.001 101.63	4.375 111.13
Maximum bump pressure (psi/MPa)	10,000 68.948					
Maximum latch-in plug backpressure rating (psi/MPa)	5,000 34.474					

Recommended Flow Rate

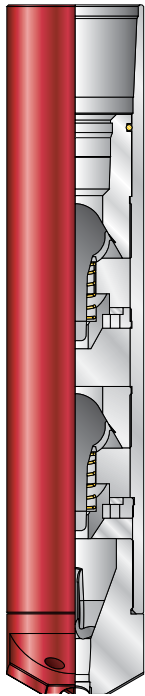
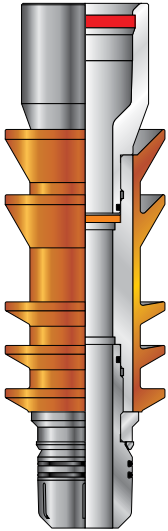
Size (in./mm)	2-7/8 73.0	3-1/2 88.9	4 101.6	4-1/2 114.3	5 127.0	5-1/2 139.7
Top-plug minimum latch-in or bump flow rate (bbl/min, m ³ /min)	2 0.3					
Top-plug maximum flow rate (bbl/min, m ³ /min)	4 0.6			6 1.0		
Bottom-plug minimum latch-in or bump flow rate (bbl/min, m ³ /min)	2 0.3					
Bottom-plug maximum flow rate (bbl/min, m ³ /min)	4 0.6			6 1.0		

Options

- Polyurethane plug fins are available for standard temperature applications in all sizes from 2-7/8 in. to 5-1/2 in.
- Combinations of sizes from 2-7/8 to 5-1/2 in. are possible.
- HNBR plug fins are available for high-temperature applications up to 392°F (200°C) in 4 1/2-in., 5-in., and 5 1/2-in. sizes, including combinations of these sizes.
- Single, dual, and triple top and bottom plugs are available for optimum wiping efficiency.
- Large-diameter high-pressure rupture disks are available from 750 to 6,000 psi (5.17 to 41.37 MPa).*

*Note: Rupture disks rated above 1,000 psi are metallic and are not PDC drillable.

Multiple Latch-In Plug System Rupture Plug System for Sizes 2-7/8 to 5-1/2 in.



Weatherford's innovative high-pressure rupture plug can be used as a single or multiple plug system to eliminate thousands of dollars of cost in horizontal wells being prepared for fracturing operations. This system, run in over 1,000 wells, provides significant value by reducing cost, eliminating nonproductive time (NPT), and placing the well on production more quickly than alternative conventional procedures.

The rupture plug in this system is the bottom plug from the multiple latch-in high-pressure plug system that has been used extensively to cement completion strings around the world. Released from Weatherford's rotating cementing head in a preplanned sequence, the plugs use adjustable rupture disks to allow cement to be overdisplaced and provide communication with the formation below the shoe after the primary cement job. The plugs isolate cement from other potentially contaminating fluids such as mud and preflushes during displacement.

The latch-in antirotation design allows casing to be tested prior to overdisplacement, and the superior wiping capability of the polyurethane fins eliminates the need for a cleanout trip. The rig can be released prior to running perforating guns, which can now be pumped down rather than run on threaded pipe.

Applications

- High-angle, horizontal wells completed in tight, low-permeability formations that require fracturing
- Cementing casing strings where pumpdown wireline perforating guns are advantageous
- Situations where casing-pressure test is required on plug bump
- Compatible and recommended for use with Weatherford's Model 3EHDL float shoes, Model 4E2HL float collars, or Model 5E4HL landing collars

Features, Advantages and Benefits

- The plug system enables the use of pumpdown wireline perforating devices, eliminating the need for a rig and tubing-conveyed equipment, reducing operational cost and NPT.
- The system incorporates a modular design composed of one or more high-pressure plugs with high-, medium-, and low-pressure rupture disks, providing plug flexibility for various well conditions.
- Polyurethane fins provide enhanced wiping capabilities and abrasion resistance, resulting in a clean casing ID, thus avoiding the need and cost of a clean-up run.
- The unique, field-changeable rupture disks provide accurate rupture pressure and burst without damaging the float valves, enabling fluid displacement past the shoe.
- The PDC- (polycrystalline diamond composite) drillable plug system's antirotational design prevents plug rotation during drillout, saving rig time.

Multiple Latch-In Plug System Rupture Plug System for Sizes 2-7/8 to 5-1/2 in.

Specifications

Performance

Size (in./mm)	2-7/8 73.0	3-1/2 88.9	4 101.6	4-1/2 114.3	5 127.0	5-1/2 139.7
Maximum circulating temperature rating of polyurethane plug fins (°F/°C)	293 145					
Maximum temperature rating of polyurethane plugs for bump pressure rating (°F/°C)	392 200					
Maximum circulating temperature rating of HNBR plug fins (°F/°C) ^a	N/A			350 176		
Maximum temperature rating of HNBR plugs for bump pressure rating (°F/°C)				392 200		
Bottom-plug rupture-disk shear pressure (psi/MPa)	750 to 6,000 5.17 to 41.37					
Minimum plug ID (in./mm)	0.85 21.6			1.50 38.1		
Minimum flow area (in. ² /mm ²)	0.56 361			1.76 1,135		
Maximum casing ID (in./mm)	2.441 62.00	2.992 75.80	3.548 90.12	4.090 103.89	4.560 115.82	5.080 129.03
Minimum pump-through drift diameter (in./mm)	2.151 54.64	2.548 64.72	3.015 76.59	3.615 91.82	4.001 101.63	4.375 111.13
Maximum bump pressure (psi/MPa)	10,000 68.948					
Maximum latch-in plug backpressure rating (psi/MPa)	5,000 34.474					

^aHNBR stands for hydrogenated nitrile butadiene rubber.

Recommended Flow Rate

Size (in./mm)	2-7/8 73.0	3-1/2 88.9	4 101.6	4-1/2 114.3	5 127.0	5-1/2 139.7
Top-plug minimum latch-in or bump flow rate (bbl/min, m ³ /min)	2 0.3					
Top-plug maximum flow rate (bbl/min, m ³ /min)	4 0.6			6 1.0		
Bottom-plug minimum latch-in or bump flow rate (bbl/min, m ³ /min)	2 0.3					
Bottom-plug maximum flow rate (bbl/min, m ³ /min)	4 0.6			6 1.0		

Options

- Polyurethane plug fins are available in all sizes from 2-7/8 in. to 5-1/2 in.
- HNBR plug fins are available for high-temperature applications of 392°F (200°C) in 4 1/2-in., 5-in., and 5 1/2-in. sizes, including combinations of these sizes.
- Combinations of sizes from 2-7/8 to 5-1/2 in. are possible.
- Large-diameter high-pressure rupture disks are available from 750 to 6,000 psi (5.17 to 41.37 MPa).*
- Single, dual, or triple configurations are available based on application and well conditions.

*Note: Rupture disks rated above 1,000 psi are metallic and are not PDC drillable.



Stage- Cementing Wiper Plugs

Stage-Cementing Wiper Plugs

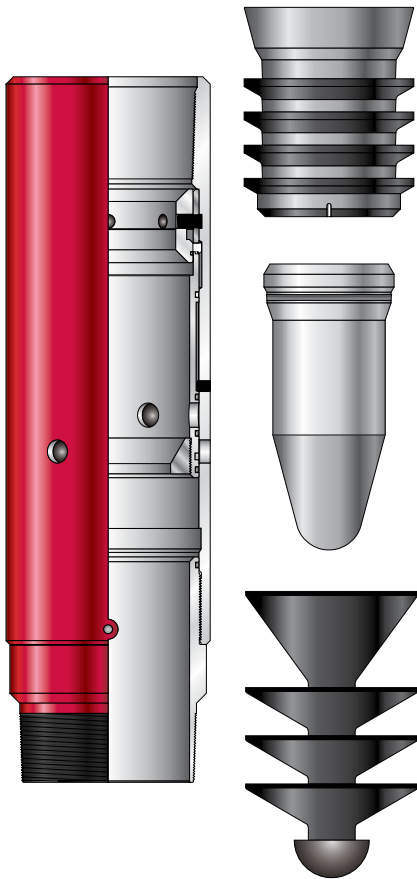
Multiple-stage cementing is an effective method to isolate wellbore sections and cement the casing string in separate intervals or stages. Weatherford offers wiper plugs and darts specifically designed to be run in casing or liner with our Eliminator® series cementing stage tools—a field-proven combination. These stage tools are opened by using either a free-fall opening cone or first-stage shutoff plug. Once the cone or plug is in place, surface pressure is applied to open the *Eliminator* tool's cementing ports.

When run in casing, the tool can be activated by using the cone or the plug. While deviated wells require the plug, vertical wells can use either. If run in a liner, the tool can only be activated with the Model 854BS plug set.

In either case, shutting off the ports is accomplished when displacement of the closing plug is completed. The closing plug lands on a seat attached to the closing sleeve. Increased pressure shifts the sleeve down across the ports and locks it with a snap ring. After closing, no pressure imbalance exists that might allow the tool to open.



Eliminator® Series Stage Tools Models 751E, 752E, 751PD and 752PD



Weatherford's *Eliminator* stage tools allow cementing of casing string in either two or three 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.

Model 751E is used for two-stage cementing. Model 752E is used for three-stage cementing. Models 751PD and 752PD, respectively, are the PDC- (polycrystalline diamond composite) drillable versions of Models 751E and 752E.

Applications

- Reduce total pumping pressure in long casing strings
- Reduce total hydrostatic pressure on a weak zone to prevent lost circulation
- Enable selective cementing of formations

Features, Advantages and Benefits

- The compact, simple design minimizes the number of moving parts and makes the tools easier 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.
- Locking and antirotation devices accelerate drillout to save rig time while the tool's greater wall thickness provides superior strength.
- The smaller-OD models create a larger fluid bypass area during circulation and displacement, minimizing the effect of pressure on sensitive formations.
- The internal sleeves increase reliability and prevent premature opening from formation restrictions or applied pressures.
- The unitary sleeve opens and closes the tool, which eliminates pressure traps and increases reliability.

Eliminator® Series Stage Tools Models 751E, 752E, 751PD and 752PD

Options

- All 751 two-stage tools are furnished with first-stage plug, 751E free-fall opening cone, and 751E closing plug, unless otherwise specified. All 752 three-stage tools are furnished with 752E free-fall opening cone (color blue) and 752E flexible closing plug (color blue), unless otherwise specified. Optional plug sets available:
 - 751E-2C, for pumpdown opening or continuous two-stage cementing, consisting of bypass plug and 751E pumpdown opening plug
 - 751E-2B, for two-plug first-stage system, consisting of bypass plug, shutoff plug and baffle
 - 752E-3C, for three-stage, pumpdown opening or continuous lower-stage cementing, consisting of bypass plug and 752E pumpdown opening plug (color blue)
 - 751E-2D for two-stage cancellation cone (color black)

Specifications

Size (in./mm)	Grade	Weight Range (lb/ft, kg/m)	Maximum OD (in./mm)	Maximum Drillout ID (in./mm)	Overall Length (in./mm)		Seat ID				Safeload Below Tool SF = 1.5 (1,000 lb/1,000 kg)		Maximum Pressures SF = 1.2		Nitrile Seal Temperature Limits* (°F/°C)	
							Model 751E Two-Stage (in./mm)		Model 752E Three-Stage (Lower Tool) (in./mm)		8 RND	BTC	Internal (psi/bar)	External (psi/bar)		
							Opening	Closing	Opening	Closing						
4-1/2 114.3	N80	9.5 to 13.5 14.1 to 20.1	5.562 141.3	3.975 101.0	STC	27.7 703.6	30.1 764.5	3.000	3.187	2.500	2.750	151 68	203 92	8,550 589.5	8,140 561.2	275 135
	P110	11.6 to 15.1 17.1 to 22.4		3.885 98.7	LTC	28.7 729.0		3.000	3.187	2.500	2.750	242 110	311 141	11,760 810.1	12,340 850.8	
5 127.0	N80	11.5 to 15.0 17.1 to 22.3	6.090 154.7	4.445 112.9	STC	28.8 731.5	31.1 789.9	3.500	3.750	3.000	3.375	175 79	238 108	8,220 566.7	8,100 558.5	275 135
	P110	15.0 to 18.0 22.3 to 26.8		4.293 109.0	LTC	29.7 754.4		3.500	3.750	3.000	3.375	321 146	395 179	10,800 744.6	10,500 723.9	
5-1/2 139.7	N80	14.0 to 17.0 20.8 to 25.3	6.625 168.3	4.897 124.4	STC	29.1 739.1	31.1 789.9	3.750	4.062	3.000	3.375	209 95	263 119	7,250 499.9	6,900 475.7	275 135
		15.5 to 20.0 23.0 to 29.7		4.835 122.8		232 105						288 131	8,170 563.3	7,780 536.4		
	P110	17.0 to 23.0 25.3 to 34.2		4.777 121.3	LTC	29.7 754.4		3.750	4.062	3.000	3.375	365 166	445 202	11,850 817.0	11,300 779.1	
		20.0 to 26.0 29.7 to 38.7		6.341 161.1	STC	30.2 767.1		4.500	5.000	3.750	4.125	276 125	391 177	5,600 386.1	5,340 368.2	
7 177.8	N80	26.0 to 32.0 38.7 to 47.6	8.200 208.3	6.161 156.5	LTC	31.1 789.9	32.1 815.3	4.500	5.000	3.750	4.125	404 183	491 223	8,380 577.8	7,880 543.3	275 135
		20.0 to 26.0 29.7 to 38.7		6.341 161.1	STC	30.2 767.1						4.500	5.000	3.750	4.125	
7-5/8 193.7	N80	26.4 to 29.7 39.3 to 44.2	8.875 225.4	6.854 174.1	STC	33.9 861.1	36.1 916.9	5.500	5.875	4.500	5.000	356 161	493 224	6,440 444.0	6,140 423.3	275 135
	P110	29.7 to 39.0 44.2 to 193.7		6.760 171.7	LTC	34.8 883.9						5.500	5.875	4.500	5.000	
8-5/8 219.1	K55	24.0 to 32.0 35.7 to 47.6	10.125 257.2	7.982 202.7	STC	34.4 873.8	36.8 934.7	6.125	6.625	5.500	5.875	311 141	467 212	5,500 379.2	3,980 274.4	275 135
	P110	40.0 to 44.0 59.5 to 65.5		7.610 193.3	LTC	35.6 904.2						6.125	6.625	5.500	5.875	
9-5/8 244.5	N80	32.3 to 40.0 48.1 to 59.5	11.125 282.6	8.855 224.9	STC	34.9 886.5	36.5 927.1	7.250	7.750	6.125	6.750	417 189	616 279	5,270 363.4	5,440 375.1	275 135
		40.0 to 47.0 59.5 to 70.0		8.689 220.7	LTC	36.3 922.0						7.250	7.750	6.125	6.750	
	P110	43.5 to 53.5 64.7 to 75.9		8.609 218.7	LTC	36.3 922.0		7.250	7.750	6.125	6.750	878 398	1,072 486	9,320 642.6	7,470 515.0	
10-3/4 273.1	N80	40.5 to 51.0 67.7 to 75.9	12.312 312.7	9.904 251.6	STC	33.8 858.5	36.5 927.1	8.250	8.875	7.250	7.750	493 224	748 339	4,990 344.0	3,790 261.3	275 135
	P110	51.0 to 60.7 75.9 to 90.4		9.704 264.5		8.250						8.875	7.250	7.750	853 387	

*Temperature limits are for Nitrile seals (standard). Limits for Viton® seals (special request) are 400°F (204°C).

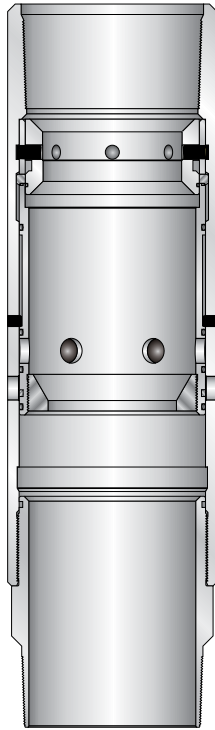
Specifications (continued)

Size (in./mm)	Grade	Weight Range (lb/ft, kg/m)	Maximum OD (in./mm)	Maximum Drillout ID (in./mm)	Overall Length (in./mm)		Seat ID				Safeload Below Tool SF = 1.5 (1,000 lb/1,000 kg)		Maximum Pressures SF = 1.2		Nitrile Seal Temperature Limits ^a (°F/°C)	
							Model 751E Two-Stage (in./mm)		Model 752E Three-Stage (Lower Tool) (in./mm)				Internal (psi/bar)	External (psi/bar)		
							Opening	Closing	Opening	Closing						
13-3/8 339.7	K55	61.0 to 72.0	15.000	12.375	STC	34.4	36.5	10.250	11.000	8.250	9.250	502 228	902 409	4,110 283.4	2,120 146.2	275 135
	P110	90.8 to 107.2	381.0	314.3		873.8	927.1	260.4	279.4	209.6	235.0	906 411	1,442 654	5,860 404.0	2,250 155.1	
16 406.4	N80	84.0 125.0	17.875 454.0	15.010 381.3	BTC	38.5 977.9	13.000 330.2	13.625 346.1	N/A	N/A	964 437	3,610 248.9	1,230 84.8	275 135		
	P110	97.0 144.4		14.820 376.4		HTG Boss		48.5 1,231.9				16.125 409.6	1,940 880		6,420 442.6	4,000 275.8
18-5/8 473.1	N80	87.5 to 136.0 130.0 to 202.4	20.75 527.1	17.439 443.0	BTC	46.0 1,168.4	15.500 393.7	16.125 409.6	N/A	N/A	1,242 563	3,700 255.1	1,840 126.9	275 135		
	P110	87.5 to 139.0 130.0 to 206.9		17.755 450.9		1,823 827	4,860 335.1	1,880 129.6								
20 508.0	K55	113.0 168.2	21.00 533.4	18.750 476.3	XLF	48.0 1,219.2	16.375 415.9	17.175 436.2	N/A	N/A	1,157 524.8	2,560 176.5	1,080 74.5	275 135		
24 609.6	X42	171.3 254.9	25.125 638.2	22.250 565.2	Butt- weld	44.5 1,130.3	17.250 438.2	19.960 507.0	N/A	N/A	1,361 617.3	1,688 116.4	864 59.6	275 135		
	X56	189.0 to 201.1 281.3 to 299.3		1,963 890.4		2,450 168.9	1,160 81.0									

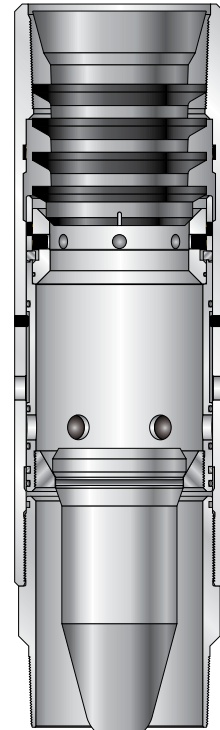
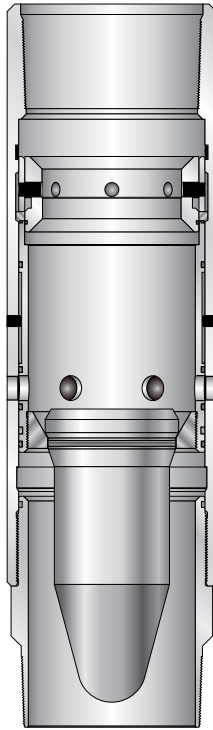
^aTemperature limits are for nitrile seals (standard). Limits for Viton[®] seals (special request) are 400°F (204°C).

Eliminator[®] Series Stage Tools Models 751E, 752E, 751PD and 752PD

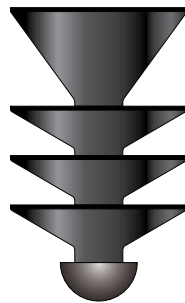
Operational Sequence



Running-in-hole

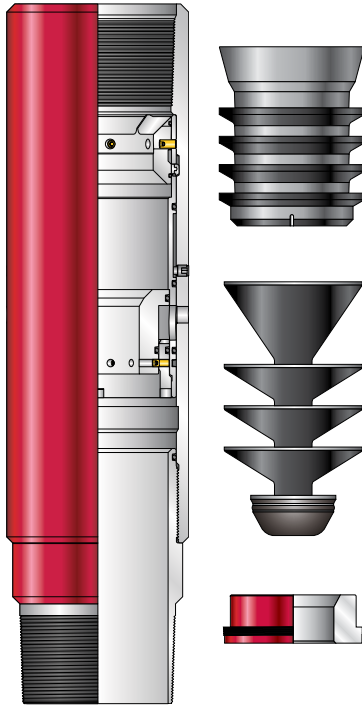


Closed:
cementing complete



Open: cementing

Hydraulic Stage Tool Model 754PD with Casing Plug Set



Weatherford's reliable, field-proven Model 754PD stage tool meets the challenges of cementing holes at any angle with a hydraulically opened port system. Designed specifically for horizontal completion in today's complex formations, the multistage cementing tool can be placed anywhere in the casing string.

Model 754PD is PDC (polycrystalline diamond composite) drillable and equipped with field-adjustable shear pins, enabling operators to choose opening pressures suitable for specific well requirements. When the first-stage shutoff plug lands on the shutoff baffle, increased internal casing pressure hydraulically opens the stage tool, enabling circulation and then second-stage cement to pass through the ports into the annulus above the tool. After the closing plug is released, it wipes the casing ID clean of cement before bumping on a closing seat connected to the unitary sleeve. Increased pressure shifts the closing seat downward, releasing locking lugs and allowing the unitary sleeve to move down across the ports, closing the tool. A snap ring locks the sleeve in position, ensuring the stage tool remains locked.

The stage tool can be used with Weatherford's BULLDOG™ ACP™ (annulus casing packers) to ensure cement slurry is placed at precise depths in the annulus around the casing string in stages to provide long-term isolation. When the first-stage shutoff plug lands on the shutoff baffle, the ACP technology inflates, isolating weak formations below from hydrostatic pressures above.

To conduct three-stage cementing operations, Weatherford offers a 754TP Model to be used as a lower-stage tool with a Model 751E Eliminator® stage tool on top. The 754TP features a smaller-ID closing seat and flexible closing plug that is necessary to close the lower-stage tool after displacement.

Hydraulic Stage Tool Model 754PD with Casing Plug Set

Applications

- Primary cementing in deep vertical or highly deviated horizontal-well conditions not conducive to free-fall opening cones
- Reduction of total hydrostatic pressure on a weak zone to prevent lost circulation during cementing
- Selective formation cementing or treating-fluid placement
- Off-bottom cementing using slotted pipe or screens in openhole
- Use with ACP™ technology to cement the last casing string above openhole completions
- Use with ACP technology to isolate formations with high temperature gradients in geothermal or steam injection wells
- Reduction of total pumping pressure in long casing strings
- Operations in which alternative fluid paths may be needed above inflated casing tools or seals
- Casing strings running Weatherford's BULLDOG™ ACP technology to isolate weak formations below from hydrostatic pressures above

Features, Advantages and Benefits

- Tool functionality is independent of hole angle or mud properties, ensuring tool durability and reliability in most applications.
- Clear surface indications of opening and closing pressures provide safer and more efficient operations.
- The absence of an opening cone, along with antirotational features and PDC-drillable materials, accelerates drillout, saving costly rig time.
- The opening pressure of the stage tool can be adjusted at the rig site to meet well requirements, providing operational flexibility.

Options

- HNBR (hydrogenated nitrile butadiene rubber) seals are standard and are API RP2 rated to resist hydrogen sulfide and carbon dioxide. Other seals can be requested to meet well conditions.
- An optional free-fall opening cone is available for use when casing pressure cannot be generated to open the tool.
- Stage tools and running accessories are available and can be ordered to perform three-stage cementing operations.
- Alternative grades of steel and threads are available for casing-string compatibility.

Specifications

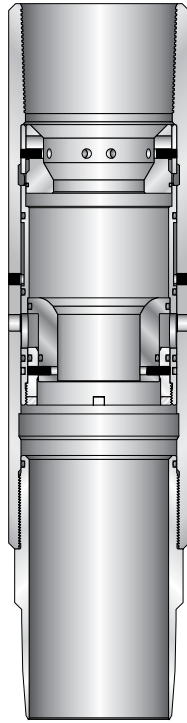
Size (in./mm)	Grade	Weight Range (lb/ft, kg/m)	Maximum OD (in./mm)	Maximum Drillout ID (in./mm)	Overall Length (in./mm)	Hydraulic Sleeve ID (in./mm)	Closing Seat ID (in./mm)	Opening Pressure ^a (psi/bar)		Safe Load Below Tool (1,000 lb/1,000 kg)		Maximum Pressures (psi/bar)		HNBR Seal Temperature Limits ^b (°F/°C)
					BTC			754PD	Per Screw	Range	8 RND	BTC	Internal	
4-1/2 114.3	L80	9.5 to 13.5 14.1 to 20.1	5.562 141.3	3.975 101.0	30.5 774.7	2.500 63.5	3.187 80.9	700 48.3	700 to 4,200 48.3 to 289.6	146 66	199 90	8,290 571	7,900 544	350 177
	P110	11.6 to 15.1 17.1 to 22.4		3.885 98.7						237 107	306 138	11,460 790	11,940 823	
5 127.0	L80	11.5 to 15.0 17.1 to 22.4	6.090 154.7	4.445 112.9	31.5 800.1	3.000 76.2	3.750 95.3	600 41.4	1,200 to 3,600 82.8 to 248.2	177 80	233 105	8,010 552	6,730 464	350 177
	P110	15.0 to 18.0 22.3 to 26.8		4.293 109.0						315 142	390 177	10,810 745	10,510 724	
5-1/2 139.7	L80	14.0 to 17.0 20.8 to 25.3	6.625 168.3	4.897 124.4	31.5 800.1	3.000 76.2	4.062 103.2	440 30.3	880 to 3,520 60.6 to 242.7	218 98	278 126	7,040 485	6,710 462	350 177
	L80	15.5 to 20.0 23.0 to 29.7		4.835 122.8						247 112	305 138	7,950 548	7,580 522	
	P110	17.0 to 23.0 25.3 to 34.2		4.777 121.3						359 162	439 199	11,400 786	10,970 756	
7 177.8	L80	20.0 to 26.0 29.7 to 38.7	8.200 208.3	6.341 161.1	32.5 825.5	3.750 95.3	5.000 127.0	340 23.4	680 to 3,400 46.9 to 234.0	298 135	385 175	5,470 377	5,210 359	350 177
	L80	26.0 to 32.0 38.7 to 47.6		6.161 156.5						398 180	485 220	7,550 520	7,200 496	
	P110			6.161 156.5						540 245	646 293	9,940 685	9,470 653	
7-5/8 193.7	L80	26.4 to 29.7 39.3 to 44.2	8.875 225.4	6.854 174.1	38.4 975.4	4.500 114.3	5.875 149.2	600 41.4	1,200 to 3,600 82.8 to 248.2	384 174	487 221	6,290 433	5,990 413	350 177
	P110	29.7 to 39.0 44.2 to 58.0		6.760 171.7						596 270	724 329	9,580 660	8,850 610	
8-5/8 219.1	L80	24.0 to 32.0 35.7 to 47.6	10.125 257.2	7.982 202.7	39.2 995.7	5.500 139.7	6.625 168.3	700 48.3	1,400 to 4,200 96.6 to 289.6	340 154	460 209	5,420 373	3,980 274	350 177
	P110	40.0 to 44.0 59.5 to 65.5		7.610 193.3						795 361	952 432	7,130 491	6,080 419	
9-5/8 244.5	L80	32.3 to 40.0 48.1 to 59.5	11.125 282.6	8.855 224.9	38.8 985.5	6.125 155.6	7.750 196.9	600 41.4	1,200 to 3,600 82.8 to 248.2	463 210	608 276	5,610 386	5,340 368	350 177
	L80	40.0 to 47.0 59.5 to 70.0		8.689 220.7						582 264	734 333	6,990 482	5,980 412	
	P110	43.5 to 53.5 64.7 to 75.9		8.609 218.7						867 394	1,062 482	9,190 633	7,290 502	
10-3/4 273.1	L80	40.5 to 51.0 67.7 to 75.9	12.312 312.7	9.904 251.6	38.8 985.5	7.250 184.2	8.875 225.4	630 43.4	1,260 to 3,780 86.8 to 260.6	552 250	739 335	5,450 375	3,700 255	350 177
	P110	51.0 to 60.7 75.9 to 90.4		9.704 246.5						959 435	1,214 551	7,510 517	4,170 287	
13-3/8 339.7	L80	61.0 to 72.0 90.8 to 107.2	15.000 381.0	12.375 314.3	38.8 985.5	9.250 235.0	11.000 279.4	500 34.5	1,000 to 3,000 69.0 to 207.0	618 280	1,007 457	4,400 303	2,070 142	350 177
	P110			12.375 314.3						841 382	1,355 615	6,200 427	2,550 175	

^aThe operator, cementer, or a trained Weatherford field technician can easily adjust opening pressure in the field to precisely match well requirements.

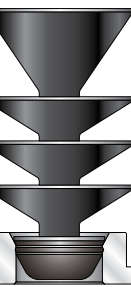
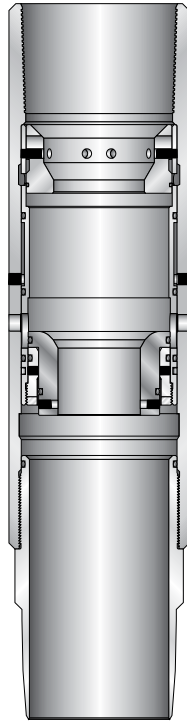
^bTemperature limits are for HNBR seals (standard). Limits for Viton[®] seals (special request) are 400°F (204°C).

Hydraulic Stage Tool Model 754PD with Casing Plug Set

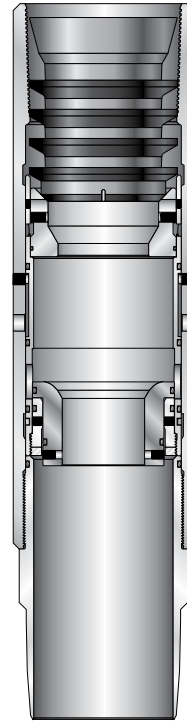
Stage Tool Sequence for Casing Operations



Ports closed:
running-in-hole

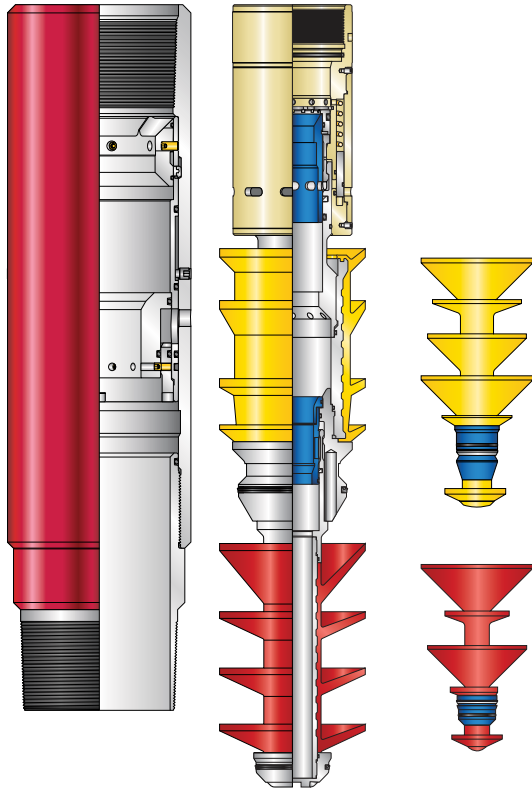


Ports open:
cementing



Ports closed:
cementing
complete

Hydraulic Stage Tool Model 754PD with 854BS Liner Plug Set



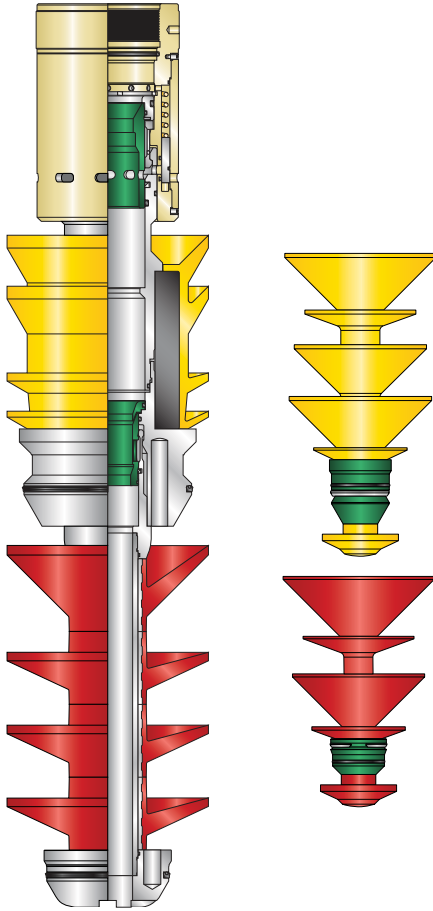
754PD with 854BS plug set for 7- and 7 5/8-in. sizes

Weatherford's reliable, field-proven Model 754PD stage tool meets the challenges of cementing holes at any angle with a hydraulically opened port system. Designed specifically for horizontal completions in today's complex formations, the multistage cementing tool uses Weatherford's 854BS liner plug set and can be placed anywhere in the casing string with a liner hanger or subsea casing hanger. The 854BS plug set is fully compatible with Weatherford's mechanical ball seat (MBS) and features a patented, integral pressure-equalizer to prevent premature plug release due to pressure buildup above the plugs.

The bottom dart is pumped behind the first-stage cement slurry from surface and latches into and releases the first-stage shutoff plug, displacing the cement slurry in the casing. When the shutoff plug lands on the landing collar, increased internal casing pressure hydraulically opens the stage tool, enabling circulation and the second-stage cement to pass through the ports into the annulus above the tool. The top dart is pumped behind the cement slurry and lands in the closing plug. After the closing plug is released, it wipes the casing ID clean of cement before bumping on a closing seat connected to the unitary sleeve. Increased pressure shifts the closing seat downward, releasing locking lugs and enabling the unitary sleeve to move down across the ports, closing the tool. A snap ring locks the sleeve in position, ensuring the stage tool remains locked.

The stage tool can be used with Weatherford's BULLDOG™ ACP™ (annulus casing packers) to ensure cement slurry is displaced to precise depths in the annulus and provide long-term isolation. When the first-stage shutoff plug lands on the landing collar, the ACP technology inflates, isolating weak formations below from hydrostatic pressures above.

Hydraulic Stage Tool Model 754PD with 854BS Liner Plug Set



854BS plug set for 9 5/8- through
13 3/8- to 14-in. sizes

Applications

- Liners or subsea casing strings that require multiple-stage cementing due to weak formations or wellbore hydrostatics
- Liners running Weatherford's BULLDOG™ ACP™ technology to isolate weak formations below from hydrostatic pressures above
- Use with ACP technology to cement the last casing string above openhole completions
- Use with ACP technology to isolate formations with high temperature gradients in geothermal or steam-injection wells

Features, Advantages and Benefits

- First-stage shutoff and closing plugs are released by darts that maintain fluid separation through the drillpipe and casing, preventing cement contamination.
- The first-stage shutoff plug provides positive indication of displacement and a hydraulic means of testing casing, opening the hydraulic stage tool, and/or setting ACP technology to ensure proper zonal isolation.
- The closing plug provides a durable seal in the closing seat of the 754PD hydraulic stage tool, enabling accurate liner testing.
- Polyurethane plug fins offer superior abrasion resistance and excellent wiping action, resulting in a clean casing ID after passage.
- The material of the plugs are compatible with water and oil- and synthetic-based drilling fluids and are durable at well temperatures up to 257°F (125°C), providing a suitable system that meets most well environments.
- The opening pressure of the stage tool can be adjusted at the rig site to meet well requirements, providing operational flexibility.
- The plug system provides a positive separation design, minimizing the potential for fluid bypass at the cementing collar.
- Fully compatible with Weatherford's MBS to eliminate the need for a ball seat within the plugs or the landing collar for improved reliability.
- The patented, integrated pressure equalizer prevents pressure buildup above the plugs, avoiding premature release.
- The system is PDC (polycrystalline diamond composite) drillable with antirotation features on the plugs, stage tool, and landing collar to prevent rotation during drillout, simplifying drillout and saving rig time and associated costs.

Options

- Stage tools and running accessories are available and can be ordered to perform three-stage cementing operations.
- Multiple combinations of pipe grade and threads are available to meet specific well conditions.

Specifications

Size (in./mm)	Grade	Weight Range (lb/ft, kg/m)	Maximum OD (in./mm)	Maximum Drillout ID (in./mm)	Overall Length (in./mm)	Hydraulic Sleeve ID (in./mm)	Closing Seat ID (in./mm)	Opening Pressure ^a (psi/bar)		Safe Load Below Tool (1,000 lb/1,000 kg)		Maximum Pressure (psi/bar)		HNBR Seal Temperature Limit ^b (°F/°C)
								BTC	754PD	Per Screw	Range	8 RND	BTC	
4-1/2 114.3	L80	9.5 to 13.5 14.1 to 20.1	5.562 141.3	3.975 101.0	30.5 774.7	2.500 63.5	3.187 80.9	700 48.3	700 to 4,200 48.3 to 289.6	146 66	199 90	8,290 571	7,900 544	350 177
	P110	11.6 to 15.1 17.1 to 22.4		3.885 98.7						237 107	306 138	11,460 790	11,940 823	
5 127.0	L80	11.5 to 15.0 17.1 to 22.4	6.090 154.7	4.445 112.9	31.5 800.1	3.000 76.2	3.750 95.3	600 41.4	1,200 to 3,600 82.8 to 248.2	177 80	233 105	8,010 552	6,730 464	350 177
	P110	15.0 to 18.0 22.3 to 26.8		4.293 109.0						315 142	390 177	10,810 745	10,510 724	
5-1/2 139.7	L80	14.0 to 17.0 20.8 to 25.3	6.625 168.3	4.897 124.4	31.5 800.1	3.000 76.2	4.062 103.2	440 30.3	880 to 3,520 60.6 to 242.7	218 98	278 126	7,040 485	6,710 462	350 177
	L80	15.5 to 20.0 23.0 to 29.7		4.835 122.8						247 112	305 138	7,950 548	7,580 522	
	P110	17.0 to 23.0 25.3 to 34.2		4.777 121.3						359 162	439 199	11,400 786	10,970 756	
7 177.8	L80	20.0 to 26.0 29.7 to 38.7	8.200 208.3	6.341 161.1	32.5 825.5	3.750 95.3	5.000 127.0	340 23.4	680 to 3,400 46.9 to 234.0	298 135	385 175	5,470 377	5,210 359	350 177
	L80	26.0 to 32.0 38.7 to 47.6		6.161 156.5						398 180	485 220	7,550 520	7,200 496	
	P110			6.161 156.5						540 245	646 293	9,940 685	9,470 653	
7-5/8 193.7	L80	26.4 to 29.7 39.3 to 44.2	8.875 225.4	6.854 174.1	38.4 975.4	4.500 114.3	5.875 149.2	600 41.4	1,200 to 3,600 82.8 to 248.2	384 174	487 221	6,290 433	5,990 413	350 177
	P110	29.7 to 39.0 44.2 to 58.0		6.760 171.7						596 270	724 329	9,580 660	8,850 610	
8-5/8 219.1	L80	24.0 to 32.0 35.7 to 47.6	10.125 257.2	7.982 202.7	39.2 995.7	5.500 139.7	6.625 168.3	700 48.3	1,400 to 4,200 96.6 to 289.6	340 154	460 209	5,420 373	3,980 274	350 177
	P110	40.0 to 44.0 59.5 to 65.5		7.610 193.3						795 361	952 432	7,130 491	6,080 419	
9-5/8 244.5	L80	32.3 to 40.0 48.1 to 59.5	11.125 282.6	8.855 224.9	38.8 985.5	6.125 155.6	7.750 196.9	600 41.4	1,200 to 3,600 82.8 to 248.2	463 210	608 276	5,610 386	5,340 368	350 177
	L80	40.0 to 47.0 59.5 to 70.0		8.689 220.7						582 264	734 333	6,990 482	5,980 412	
	P110	43.5 to 53.5 64.7 to 75.9		8.609 218.7						867 394	1,062 482	9,190 633	7,290 502	
10-3/4 273.1	L80	40.5 to 51.0 67.7 to 75.9	12.312 312.7	9.904 251.6	38.8 985.5	7.250 184.2	8.875 225.4	630 43.4	1,260 to 3,780 86.8 to 260.6	552 250	739 335	5,450 375	3,700 255	350 177
	P110	51.0 to 60.7 75.9 to 90.4		9.704 246.5						959 435	1,214 551	7,510 517	4,170 287	
13-3/8 339.7	L80	61.0 to 72.0 90.8 to 107.2	15.000 381.0	12.375 314.3	38.8 985.5	9.250 235.0	11.000 279.4	500 34.5	1,000 to 3,000 69.0 to 207.0	618 280	1,007 457	4,400 303	2,070 142	350 177
	P110			12.375 314.3						841 382	1,355 615	6,200 427	2,550 175	

^aThe operator, cementer, or a trained Weatherford field technician can easily adjust opening pressure in the field to precisely match well requirements.

^bTemperature limits are for HNBR (hydrogenated nitrile butadiene rubber) seals (standard). Limits for Viton® seals (special request) are 400°F (204°C).

Hydraulic Stage Tool Model 754PD with 854BS Liner Plug Set

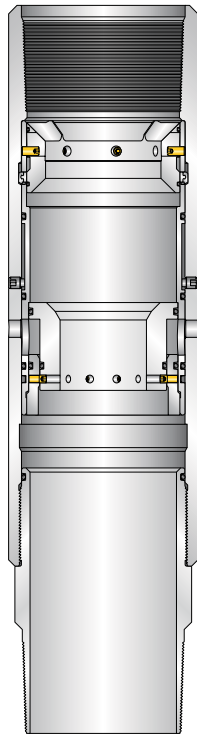
Specifications (continued)

854BS Liner Plug Set^a

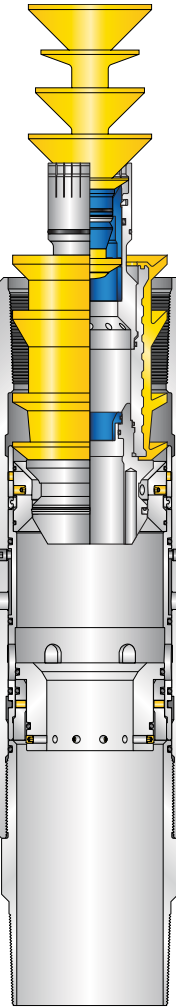
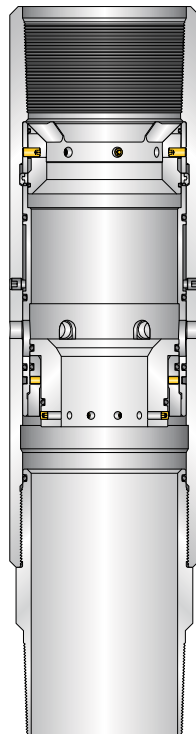
Plug size (in./mm)	7 177.8	7-5/8 193.7	9-5/8 244.5	9-5/8 × 10-3/4 244.5 × 237	13-3/8 to 14 339.7 to 355.6
Maximum plug-bump pressure (psi/MPa)	5,000 34.474				
Shutoff plug launch pressure (psi/MPa)	800 to 1,200 5.516 to 8.274				
Closing plug launch pressure (psi/MPa)	2,000 to 2,500 13.790 to 17.237				
Pressure required to open equalizer (psi/MPa)	50 to 100 0.345 to 0.689		30 to 60 0.207 to 0.414		
Minimum plug ID (in./mm)	1.78 45.2		2.11 53.5		
Minimum flow area (in. ² /mm ²)	2.49 1,606		3.50 2,258		
Maximum rigid dart diameter (in./mm)	2.13 54		2.48 59.9		
Minimum pump-through drift diameter for dart (in./mm)	2.17 55		2.54 64.5		
Flow endurance	10 BPM for 24 hr		18 BPM for 16 hr		
Maximum circulating temperature (°F/°C) (BHCT)	257 125				
Maximum static temperature after bump (°F/°C) (BHCT)	302 150				
Thread connection box up (in.)	4.750 - 6 Stub Acme 2G				

^aModel 854 plug sets are available for 4 1/2- to 5 1/2-in. liner sizes.

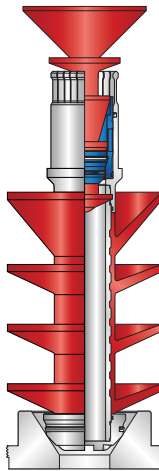
Stage Tool Sequence for Liner Operations



Running-in-hole:
ports closed

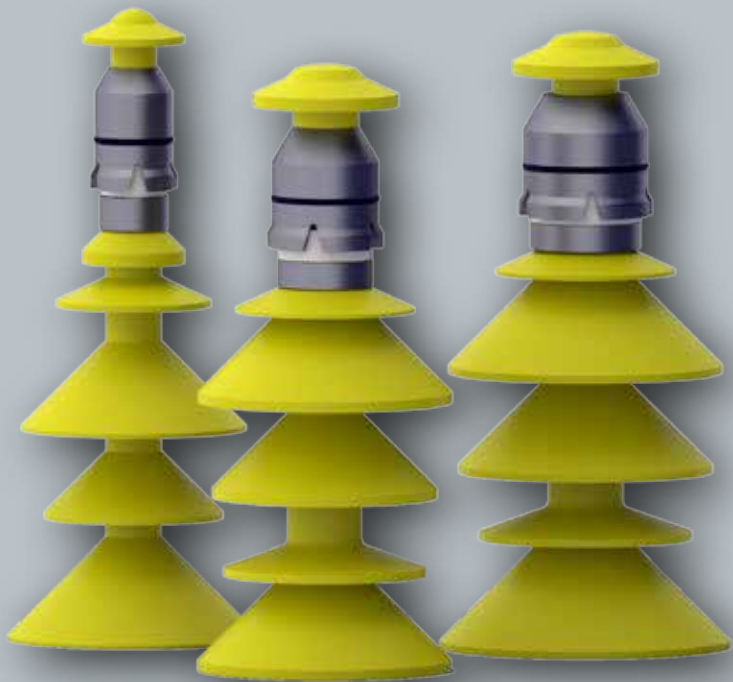


Bump closing plug:
closes ports



Bump first-stage shutoff plug:
opens ports

Darts



Inner-String Latch-In Stinger Dart



Weatherford's inner-string latch-in stinger dart is pumped behind cement and wipes the inside of drillpipe or tubing strings, providing a mechanical barrier between cement and spacer fluids or between mud and cement.

The stinger dart is designed for use with Weatherford's inner-string stab-in float equipment to cement large-diameter casing strings. The stinger dart is launched from Weatherford's cementing head, displacing fluids through the drillpipe or tubing string while preventing cement contamination. The stinger dart features a seal ring on the aluminum nose, enabling the device to withstand high differential pressures when latched into the float equipment by a corresponding snap ring.

Using the stinger dart with Weatherford's inner-string float equipment greatly reduces displacement time by enabling cement to be pumped until noted at surface, preventing large quantities of cement at the seabed, significantly reducing drillout times.

Applications

- Wiping drillpipe or tubing in conjunction with Weatherford's inner-string float equipment
- Large-diameter casing strings requiring inner-string cementing

Features, Advantages and Benefits

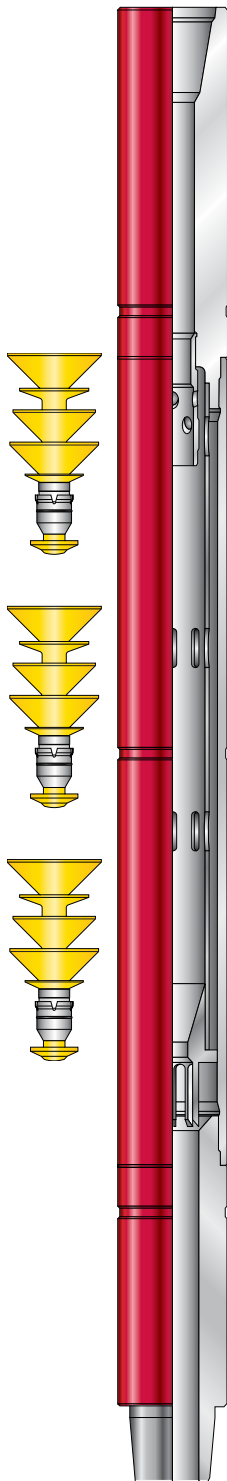
- Composed entirely of PDC- (polycrystalline diamond composite) drillable materials, the stinger dart enables trouble-free drillout, conserving rig time.
- Seal ring provides a positive bidirectional seal when latched into float equipment with the corresponding aluminum snap ring, enabling the device to withstand exceptionally high backpressures.
- Dart acts as a mechanical barrier between displacement fluids to prevent cement contamination, resulting in a clean pipe ID.
- Angled, aluminum nose prevents the dart from hanging up in the drillpipe or tubing string, ensuring proper functionality of the device.
- Polyurethane fins offer superior abrasion resistance and excellent wiping action, resulting in a clean casing ID after passage.
- Fin design enables versatility, stability, and superior wiping action for drillpipe and tubing strings, providing operational flexibility.

Specifications

Drillpipe Plug Size (in./mm)	Minimum Pump-Through Drift (in./mm)	Minimum ID (in./mm)	Maximum ID (in./mm)	Maximum Bump Pressure ^a (psi/MPa)	Maximum Back Pressure ^a (psi/MPa)
4.500 to 5.000 114.3 to 127.0	2.414 61.3	3.00 76.0	4.47 113.5	7,000 48.26	5,000 34.47
5.000 to 5.500 127.0 to 139.7	2.414 61.3	3.48 88.4	4.95 125.7	7,000 48.26	5,000 34.47
5.875 149.2	2.414 61.3	3.48 88.4	5.09 129.3	7,000 48.26	5,000 34.47
6.625 168.3	2.414 61.3	4.95 125.7	5.85 148.6	7,000 48.26	5,000 34.47

^aRatings are only valid for the dart. When the float equipment rating is lower, the float equipment performance is the limitation. When the float equipment rating is higher, the dart performance is the limitation.

Dart-Catcher Tool



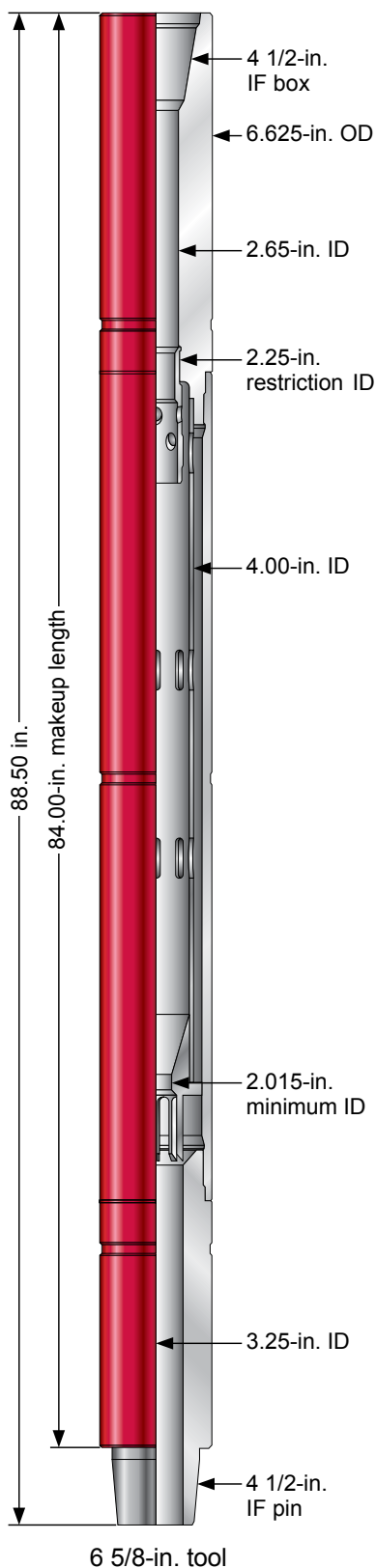
Weatherford's dart-catcher tool is used in cementing operations to provide a surface indication of the precise location of a cement plug or cement displacement. Released from Weatherford's cementing head and pumped behind the cement slurry, an indicating dart passes through a restriction inside the tool and creates a pressure increase detected at the surface. After the pressure indication, pumping can be reduced or terminated immediately, avoiding cement overdisplacement. Multiple cement plugs may be set in a single trip downhole without tripping the pipe out of the hole. A ported receptacle in the tool traps and contains up to three indicating darts after they pass the internal restriction. The receptacle also enables forward and reverse flow through the tool after indication of the cement placement. Both the darts and the dart-catcher tool are compatible with water- and oil-based drilling fluids and cement. After the cementing job is complete, the tool is retrieved.

Applications

- Inner-string cementing
- Cementing subsea casing strings with tailpipe
- Setting cement plugs when a wellbore is to be sidetracked
- Setting cement plugs when a well is to be abandoned

Features, Advantages and Benefits

- The tool uses special darts to provide a positive indication of accurate cement placement during the setting of cement plugs.
- The darts wipe cement from the drillpipe ID after cement displacement, reducing pipe-cleaning costs and preventing equipment failure from drilling fluids contaminated by cement.

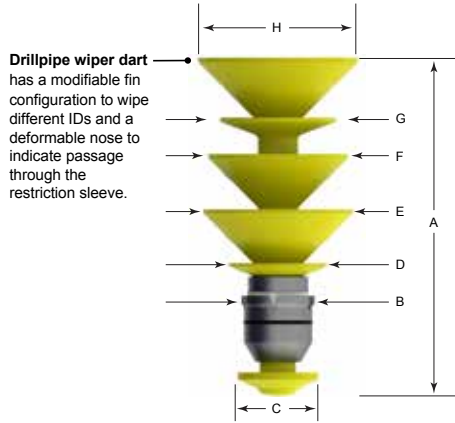


Specifications

Tool size ^a (in./mm)	3-1/2 88.9			6-5/8 168.3
	Box-and-pin connection ^a (in.)	GPXT-31 3-1/2	NC-38 3-1/2	NC-31 2-7/8
Maximum tool OD (in./mm)	4.500 114.30	4.875 123.83	4.500 114.30	6.625 168.28
Minimum ID through-bore (in./mm)	1.525 38.74			2.015 51.18
Restriction ID (in./mm)	1.650 41.91			2.250 57.15
Minimum flow area (in. ² /mm ²)	1.708 1,101.93	2.138 1,379.35	1.708 1,101.93	3.980 2,567.74
Minimum ID restriction darts can pass (in./mm)	1.90 48.3			2.56 65.0
Tensile rating (lb/kg)	325,000 147,418			750,000 340,194
Torque rating (ft-lbf/N·m)	10,700 14,507		6,400 8,677	21,700 29,421
Drillpipe nominal OD wiped (in./mm)	3-1/2 88.9		2-7/8 and 3-1/2 73.0 and 88.9	4-1/2, 5, 5-1/2, 5-7/8, and 6-5/8 114.3, 127.0, 139.7, 149.2, and 168.3
Drift (in./mm)	1.874 47.6			2.480 63.0
Temperature rating (°F/°C)	350 177			350 177
Pressure indication range (psi/MPa)	1,000 to 2,000 6.895 to 13.790			800 to 1,500 5.516 to 10.341
Working pressure rating (psi/MPa)	10,000 68.948			
Test pressure (psi/MPa)	12,000 82.737			

^aOther tool sizes and connections may be available.

Dart-Catcher Tool

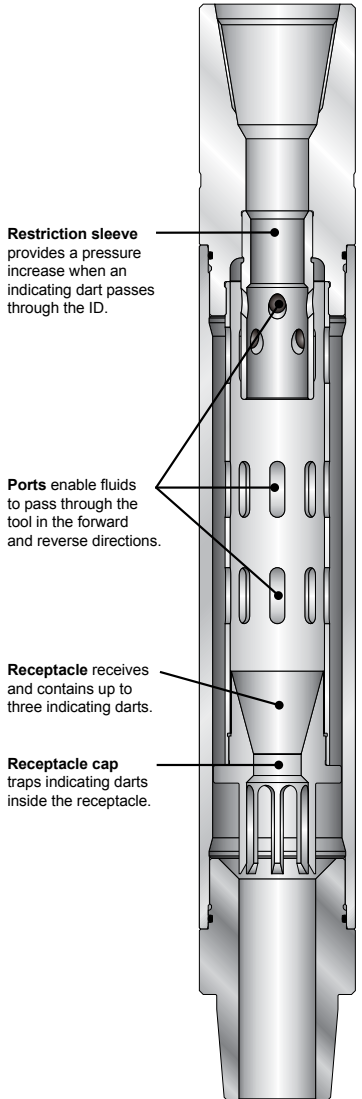


Dart specifications

Pump-Through Pressures	
Pump-through pressure in mud ^a (psi/MPa)	1,300 to 2,000 8.963 to 13.789
Pump-through pressure in cement ^a (psi/MPa)	2,000 to 2,700 13.789 to 18.615
Temperature (°F/°C)	275 135

^aPump-through pressure will vary depending on well temperature, type of fluid, and fluid viscosity.

Dart Fin OD (in./mm)	Wiping Range	
	Minimum ID (in./mm)	Maximum ID (in./mm)
2.17 55.0	1.83 46.5	2.04 51.8
3.07 78.0	2.14 54.4	2.87 72.9
3.25 82.6	2.25 57.2	3.00 76.2
3.77 95.8	2.77 70.4	3.52 89.4
4.00 101.6	3.00 76.2	3.75 95.3
4.25 108.0	3.25 82.6	4.00 101.6
4.48 113.8	3.48 88.4	4.22 107.2
4.72 119.9	3.72 94.5	4.47 113.5
5.34 135.6	4.34 110.2	5.09 129.3
5.75 146.1	4.75 120.7	5.50 139.7
6.10 154.9	5.10 129.5	5.85 148.6



Dart Nose OD of 1.830 in. for 1.650-in. Restriction Sleeve									
Drillpipe Size (in./mm)	JDE Part Number	A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)	G (in./mm)	H (in./mm)
2.875 to 5.000 73.0 to 127.0	2106882	12.96 329.2	1.83 46.6	2.17 55.0	2.17 55.0	3.25 82.6	4.25 108.0	3.25 82.6	4.72 119.9
5.000 to 5.875 127.0 to 149.2	2106886	13.22 336.0					4.72 119.9	3.77 95.8	5.34 135.6

Dart Nose OD of 2.440 in. for 2.255-in. Restriction Sleeve									
Drillpipe Size (in./mm)	JDE Part Number	A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)	G (in./mm)	H (in./mm)
3.500 to 5.000 88.9 to 127.0	2092141	12.96 329.2	2.44 62.0	3.07 78.0	3.77 95.8	4.72 119.9	4.00 101.6	3.25 82.6	4.72 119.9
5.000 to 5.875 127.0 to 149.2	2092145	12.72 323.0				5.34 135.6	4.72 119.9	4.25 108.0	5.34 135.6
5.000 to 5.875 127.0 to 149.2	2018473	13.03 331.0				5.75 146.1	5.34 135.6	4.48 113.8	6.10 154.9

Dart Nose OD of 2.810 in. for 2.630-in. Restriction Sleeve									
Drillpipe Size (in./mm)	JDE Part Number	A (in./mm)	B (in./mm)	C (in./mm)	D (in./mm)	E (in./mm)	F (in./mm)	G (in./mm)	H (in./mm)
3.500 to 5.000 88.9 to 127.0	2106884	12.35 313.7	2.81 71.5	3.07 78.0	3.77 95.8	4.72 119.9	4.00 101.6	3.25 82.6	4.72 119.9
5.000 to 5.875 127.0 to 149.2	2106888	12.61 320.3				5.34 135.6	4.72 119.9	4.25 108.0	5.34 135.6
5.875 to 6.625 149.2 to 168.3	2106892	12.92 328.0				5.75 146.1	5.34 135.6	4.48 113.8	6.10 154.9





Casing Wiper Plugs and Darts

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