

# 04

## Drillable Service Tools



### Introduction

This section contains information about tool applications, sizes available, running, setting, and operating drillable tools and related accessories. Drillable Service Tools have many functions including wellbore isolation, stimulation isolation, remedial cementing, and plug and abandonment.

Halliburton is dedicated to providing top-quality equipment and service. Halliburton maintains strict standards and well-documented processes and procedures to help ensure excellence and dependability in our Drillable Service Tools equipment.

As the industry leader in composite material products, Halliburton is well suited to deliver high-performance drillable tools for wellbore isolation, stimulation, remedial cementing, and plug and abandonment operations.

## EZ Drill® Packers and Bridge Plugs

The EZ Drill® line of tools consists of packers and bridge plugs that can be used for applications, such as wellbore isolation, remedial cementing, and plug and abandonment. Halliburton offers two styles of packers: a poppet valve squeeze packer and a sliding valve (SV/SVB) squeeze packer. The poppet valve squeeze packer contains a one-way check valve that allows operators to place cement below the packer and check backflow without the need for workstring manipulation to open or close the poppet valve. The SV squeeze packer can control flow and differential pressure in either direction by workstring manipulation of the sliding valve inside the tool. Using a conversion kit, either of these packers can be altered to create a top-drilling bridge plug capable of holding differential pressure in either direction.

### Features and Benefits

- » Can be set mechanically or hydraulically on jointed pipe, coiled tubing, electric wireline, or slickline using the Halliburton DPU® downhole power unit
- » Sets in a wide range of casing sizes and grades
- » Effective setting and sealing in elevated temperatures and pressures
- » Tool OD held to a minimum, allowing more clearance between the tool and casing for faster run-in



HAL-124062

EZ Drill®  
Squeeze Packer

## EZ Drill® Packers and Bridge Plugs

Casing Size in. (mm)	Maximum Casing ID in. (mm)	Minimum Casing ID in. (mm)	Maximum Tool OD in. (mm)	Rated Pressure psi (MPa)	Poppet Valve	Sliding Valve	API 11D1 Qualified
2 7/8 (73.0)	2.440 (62.0)	2.320 (58.9)	2.18 (55.4)	10,000 (69.0)	X		
3 1/2 (88.9)	3.240 (82.3)	2.890 (73.4)	2.69 (68.3)	10,000 (69.0)	X	X	
4 (101.6)	3.640 (92.5)	3.320 (84.3)	3.12 (79.2)	10,000 (69.0)	X	X	
4 1/2 (114.3)	3.920 (99.6)	3.826 (97.2)	3.58 (90.9)	10,000 (69.0)	X	X	
5 (127.0)	4.560 (115.8)	4.276 (108.6)	3.97 (100.8)	10,000 (69.0)	X	X	X
5 1/2 (139.7)	5.040 (128.0)	4.670 (118.6)	4.37 (111.0)	10,000 (69.0)	X	X	X
6 (152.4)	5.590 (142.0)	5.220 (132.6)	4.87 (123.7)	10,000 (69.0)		X	
6 5/8 (168.3)	5.900 (149.9)	5.670 (144.0)	5.32 (135.1)	10,000 (69.0)		X	
7 (177.8)	6.460 (164.1)	5.900 (149.9)	5.50 (139.7)	10,000 (69.0)	X	X	X
7 5/8 (193.7)	7.125 (181.0)	6.500 (165.1)	6.12 (155.4)	10,000 (69.0)		X	X
8 5/8 (219.1)	7.830 (198.9)	7.310 (185.7)	6.88 (174.8)	10,000 (69.0)		X	
8 5/8 (219.1)	8.130 (206.5)	7.450 (189.2)	7.00 (177.8)	10,000 (69.0)		X	
9 5/8 (244.5)	9.063 (230.2)	8.157 (207.2)	7.74 (196.6)	7,500 (51.7)		X	X
10 3/4 (273.1)	9.500 (241.3)	9.156 (232.6)	8.69 (220.7)	7,500 (51.7)		X	X
10 3/4 (273.1)	10.192 (258.9)	9.560 (242.8)	9.00 (228.6)	7,500 (51.7)		X	X
11 3/4 (298.5)	10.406 (264.3)	10.282 (261.2)	9.73 (247.1)	7,500 (51.7)		X	
11 3/4 (298.5)	11.084 (281.5)	10.438 (265.1)	9.87 (250.7)	7,500 (51.7)		X	
13 3/8 (339.7)	12.281 (311.9)	11.907 (302.4)	11.31 (287.3)	5,000 (34.5)		X	
13 3/8 (339.7)	12.715 (323.0)	12.281 (311.9)	11.68 (296.7)	5,000 (34.5)		X	X
16 (406.4)	15.250 (387.4)	14.688 (373.1)	13.96 (354.6)	2,500 (17.2)		X	X
18 5/8 (473.1)	18.000 (457.2)	17.439 (443.0)	16.80 (426.7)	2,500 (17.2)		X	
20 (508.0)	19.124 (485.7)	17.938 (455.6)	17.24 (437.9)	2,500 (17.2)		X	

These ratings are guidelines only. For more information, contact your local Halliburton representative.

## Casing Alignment Tool

Severe corrosive action, excess tensile loading, or joint backoff during drilling operations can part casing strings. Sometimes these parted sections become misaligned, making well operations difficult. In such case, the operator must either abandon further work below this point or realign and stabilize the parted casing, adding extra time and costs to the operation.

### Casing Alignment

The Halliburton casing alignment tool has been used to successfully realign and permanently stabilize many parted casing strings. The casing alignment tool is made up by connecting threads at the lower end of the EZ Drill® (poppet valve) squeeze packer. The EZ Drill SVB squeeze packer can be used in conjunction with a poppet-type valve adapter kit. When lowered into the well, the tapered nose of the alignment tool guides the main body into the shifted lower casing. Continued lowering forces the larger, close-fitting outer case of the alignment tool into the lower casing string to align the casing sections.

### Casing Stabilization

The EZ Drill (or adapted EZ Drill SVB) squeeze packer is set by tubing or drillpipe to pack off within the upper string. The packer forms an upper seal for placement of permanent stabilizing cement behind the realigned casing and holds the alignment tool in place across the parted section of the casing. Cement slurry is then pumped through the squeeze packer and the alignment tool, filling the casing and the formation annular space surrounding the casing alignment tool.

After the cement sets, the squeeze packer, alignment tool, and cement are drilled out using a conventional rock bit, leaving a uniform diameter passage through the casing ID. The new cement barrier also helps isolate the casing interior from formation fluid or gas intrusion.

### Equipment

After the problem well is evaluated, the proper alignment tool is built. Casing alignment tools are custom manufactured for specific jobs because of the various diameter/length combinations possible. Alignment tool ODs vary according to individual casing weights to minimize clearance between the alignment tool and the casing ID. This helps establish minimum alignment variation between upper and lower realigned casing sections. Alignment tool lengths vary because casing separation lengths as well as damaged casing lengths vary. Experience proves that 10 ft of alignment tool should extend into good pipe on both sides of the damaged or parted casing.

As mentioned, the lower end of the EZ Drill (poppet valve) squeeze packers have threads to attach the alignment tool. EZ Drill squeeze packers are not made for casings 7 5/8 in. or larger, so the EZ Drill SVB squeeze packer plus poppet valve conversion kit is necessary to attach the alignment tool. This conversion kit also changes the packer from side discharge to bottom discharge, so cement slurry will flow through the alignment tool and exit at the lower end.

The casing alignment tool is available in 4 1/2-in. to 20-in. sizes.



HAL124066

Casing  
Alignment Tool

**HALLIBURTON**

Completion Tools

## DrillGun™ Assembly (EZSVB)

The DrillGun™ assembly is a drillable perforating system that provides reliable, quality performance while lowering overall wellsite costs by:

- » Eliminating the high costs associated with wireline services
- » Eliminating the need to switch to a mud system during workovers

The DrillGun perforating system combines rugged, reliable Halliburton perforating components with the versatility of drillable materials. The DrillGun perforating system is a drillable, disposable system that helps save time and costs.

Components of the drillable perforating system are drillpipe conveyed to the zone of interest, thereby eliminating mobilization or demobilization charges normally associated with wireline units. Additionally, because no mud system is necessary, clear fluids can remain in place during workover operations. When the EZ Drill® SVB packer is set, the firing head is actuated by pressure applied through the tubing. After perforating, the gun can be drilled out using conventional drilling methods.

The drillable perforating system is ideal for:

- » Single-trip perforating, packer placement, and cementing on tubing
- » Cementing and perforating in underbalanced conditions
- » Plug-to-abandon operations
- » Workover cementing with clear fluids
- » Plugback set on wireline
- » Limited-entry drillstem testing

Components of the drillable perforating system include:

- » Aluminum perforating gun
- » High-performance perforating charges
- » Halliburton industry-proven EZ Drill SVB packer
- » Also available in select sizes with Fas Drill® SVB and composite gun systems



### DrillGun™ Assembly Perforating

Tool Size in.	Thread Size and Type in. (mm)	Maximum OD in. (mm)	Maximum Operating Pressure psi (MPa)	Minimum Operating Pressure psi (MPa)	Temperature Rating °F (°C)	Maximum Overall Length ft (m)	Weight lb (kg)
4	2 7/8 EU 8 Rd (73.03 EU 8 Rd)	4.00 (101.6)	14,500 (99.98)	3,500 (24.13)	350 max. (176.7)	3.98 (1.213)	79 (34.0)
7	2 7/8 EU 8 Rd (73.03 EU 8 Rd)	7.00 (177.8)	14,500 (99.98)	3,500 (24.13)	350* (176.7)	4.10 (1.251)	N/A

\*Dependent on explosives. For use in wells above 350°F, contact a Halliburton TCP Technology representative. These ratings are guidelines only. For more information, contact your local Halliburton representative.

## Fas Drill<sup>®</sup> Packers and Bridge Plugs

The Fas Drill<sup>®</sup> line of tools consists of composite packers and bridge plugs that can be used for applications, such as wellbore isolation, stimulation isolation, remedial cementing, and temporary plug and abandonment. Halliburton offers a composite sliding valve (SVB) squeeze packer that can control flow and differential pressure in either direction by workstring manipulation of the sliding valve inside the tool. The Fas Drill bridge plug, manufactured from composite materials, functions similarly to a conventional drillable bridge plug. It is ideal for situations requiring temporary abandonment or where minimal weight is available to remove a conventional metal bridge plug. As with all Halliburton drillable bridge plugs, they are drilled from the top down, providing reliable well control.

### Features and Benefits

- » Can be set mechanically or hydraulically on jointed pipe, coiled tubing, electric wireline, or slickline using the Halliburton DPU<sup>®</sup> downhole power unit
- » Sets in a wide range of casing sizes and grades
- » Tool OD held to a minimum, allowing more clearance between the tool and casing for faster run-in
- » Helps save rig time and reduce casing damage caused by long drillout processes
- » Drills out with conventional tricone, PDC, or with junk-mill bits



HAL123717

Fas Drill<sup>®</sup> SVB  
Squeeze Packer

## Fas Drill® Packers and Bridge Plugs

Casing Size in. (mm)	Maximum Casing ID in. (mm)	Minimum Casing ID in. (mm)	Maximum Tool OD in. (mm)	Rated Pressure* psi (MPa)	Packer	Bridge Plug
2 7/8 (73.0)	2.440 (62.0)	2.260 (57.4)	2.12 (53.8)	10,000 (69.0)		X
4 1/2 (114.3)	3.826 (97.2)	3.640 (92.5)	3.44 (87.4)	10,000 (69.0)		X
4 1/2 (114.3)	4.090 (103.9)	3.920 (99.6)	3.66 (93.0)	10,000 (69.0)	X*	X
5 (127.0)	4.276 (108.6)	4.126 (104.8)	3.85 (97.8)	10,000 (69.0)		X
5 (127.0)	4.560 (115.8)	4.276 (108.6)	3.97 (100.8)	10,000 (69.0)		X
5 1/2 (139.7)	4.778 (121.4)	4.376 (111.2)	4.15 (105.4)	10,000 (69.0)		X
5 1/2 (139.7)	4.950 (125.7)	4.670 (118.6)	4.37 (111.0)	10,000 (69.0)	X*	X
7 (177.8)	6.184 (157.1)	5.920 (150.4)	5.50 (139.7)	8,000 (55.2)	X*	X
7 (177.8)	6.456 (164.0)	6.184 (157.1)	5.80 (147.3)	8,000 (55.2)	X*	X
7 5/8 (193.7)	7.125 (181.0)	6.500 (165.1)	6.12 (155.4)	5,000 (51.7)	X	X
9 5/8 (244.5)	9.063 (230.2)	8.157 (207.2)	7.75 (196.9)	5,000 (51.7)	X	X
10 3/4 (273.1)	9.450 (240.0)	9.190 (233.4)	8.69 (220.7)	5,000 (51.7)	X	
10 3/4 (273.1)	9.950 (252.7)	9.560 (242.8)	9.00 (228.6)	5,000 (51.7)	X	X
11 3/4 (298.5)	11.084 (281.5)	10.420 (264.7)	9.87 (250.7)	5,000 (51.7)	X	
13 3/8 (339.7)	12.715 (323.0)	12.280 (311.9)	11.68 (296.7)	5,000 (51.7)	X	X
16 (406.4)	15.250 (387.4)	14.610 (371.1)	13.96 (354.6)	2,000 (13.8)	X	
18 (457.2)	17.145 (435.5)	16.563 (420.7)	16.25 (412.8)	3,500 (24.1)	X	

\*Packers are rated to a maximum of 5,000 psi unless otherwise noted.

## Mechanical Setting Tool

The Halliburton mechanical setting tool sets and operates all drillable tools. This setting tool is run on tubing or drillpipe and is operated by workstring rotation and reciprocation.

The load transfer feature of the tool limits the amount of string weight that can be applied to the sliding valve. This feature helps ensure that the packer mandrel is placed in compression rather than in tension, making the tool more resistant to breakage.

### Features and Benefits

- » Acts as a load transfer device
- » Provides positive indication when packer is set
- » Allows tubing or drillpipe to be rotated as the tool comes out of the hole

### Operation

The drag blocks/springs contact the well casing to restrict the rotation of the outer components while the right-hand rotation of the workstring causes the outer components to move down and begin the setting motion.

The right-hand rotation unlatches the packer lock ring and sets the top slips. An upward pull on the workstring completely sets the packer and releases it from the setting tool.

Additional right-hand rotation moves the setting tool's outer components farther downward to unlock the upper mandrel from the drag blocks, which moves the setting tool's outer components upward. This movement allows the lower mandrel to extend down far enough to operate the squeeze packer sliding valve. The disengagement also causes the setting tool to become freewheeling, so the workstring can be rotated out of the hole without causing excessive wear on the setting tool drag blocks/springs.

The setting tool will not cycle again until it is redressed with the setting sleeve properly locked in place and the keys are returned to their grooves.



HAL123761

Mechanical  
Setting Tool

### Mechanical Setting Tools—Drag-Spring Type

Tool Size in. (mm)	Maximum Tool OD Drag-Spring Type in. (mm)	Overall Length Drag-Spring Type in. (mm)	Minimum Tool ID in. (mm)	Tensile Strength* lb (kg)
2 7/8 (73.0)	2.20 (55.9)	42.17 (1071.1)	0.59 (15.0)	36,000 (16 329)
3 1/2 (88.9)	2.69 (68.3)	51.22 (1301.0)	0.56 (14.2)	62,500 (28 350)
4 1/2 to 5 (114.3 to 127.0)	3.55 (90.2)	67.57 (1716.3)	0.87 (22.1)	130,000 (58 967)
5 1/2 to 6 5/8 (139.7 to 168.3)	4.35 (110.5)	37.18 (944.4)	1.00 (25.4)	130,000 (58 967)
7 to 8 5/8 (177.8 to 219.1)	5.53 (140.5)	34.17 (867.9)	1.13 (28.7)	139,000 (63 049)
9 5/8 to 13 3/8 (244.5 to 339.7)	7.00 (177.8)	38.40 (975.4)	1.62 (41.2)	316,000 (143 337)
16 to 20 (406.4 to 508.0)	13.12 (333.2)	59.22 (1504.2)	1.62 (41.2)	316,000 (143 337)

Note: These are the most common sizes. Other sizes might be available.

\*The tensile strength value is calculated with new tool conditions. Stress area calculations are used to calculate tensile strength.

These ratings are guidelines only. For more information, contact your local Halliburton representative.

### Mechanical Setting Tools—Drag-Block Type

Tool Size in. (mm)	Maximum Tool OD Drag-Block Type in. (mm)	Minimum Tool ID in. (mm)	Overall Length Drag-Block Type in. (mm)	Tensile Strength* lb (kg)
4 1/2 to 6 5/8 (114.3 to 168.3)	3.56 (90.4)	0.87 (22.1)	86.46 (2196.1)	130,000 (58 967.6)
7 to 8 5/8 (177.8 to 219.1)	5.65 (143.5)	1.13 (28.7)	71.30 (1811.0)	139,000 (63 049.34)
9 5/8 to 13 3/8 (244.5 to 339.7)	7.00 (177.8)	1.62 (41.2)	38.40 (975.4)	316,000 (143 337.6)

Note: These are the most common sizes. Other sizes might be available.

\*The tensile strength value is calculated with new tool conditions. Stress area calculations are used to calculate tensile strength.

These ratings are guidelines only. For more information, contact your local Halliburton representative.

## BP Hydraulic Setting Tool

BP hydraulic setting tools set Halliburton drillable packers and plugs with workstring pressure. They have no mechanism for operating tools once they are set. Because BP hydraulic setting tools use no plugs or balls for operation, they are ideal for horizontal applications.

### Design Features

BP hydraulic setting tools can be run on drillpipe, tubing, or coiled tubing. Two versions of the BP hydraulic setting tool are available: fill and non-fill.

- » Fill-type BP hydraulic setting tools have a hydrostatically operated fill valve that allows the workstring to fill during the trip into the hole. This fill valve has shear pins that are preset at the surface to a predetermined hydrostatic pressure. Once the fill valve reaches the preset hydrostatic pressure, the pins shear and the fill valve closes and locks. The fill valve cannot be opened after it closes.
- » Non-fill BP hydraulic setting tools have no means for filling the workstring on the trip in, so an auxiliary fill valve (RTTS® bypass, etc.) or filling from the surface is necessary. The differential pressure between the wellbore fluid and dry workstring does not adversely load the setting mechanism during the trip in.

In both versions, the setting piston is activated by a predetermined internal pressure applied to the workstring. This pressure shears the pins holding the setting piston, moving it down against the plug, and setting the top slips. Additional pressure fully sets the plug or packer and parts the tension sleeve/pins.

After the plug or packer sets, the workstring is raised 4 to 5 ft (1.22 to 1.52 m). Continued internal pressure to the workstring causes the setting piston to move down, which opens the tool to establish circulation. Cement can then be spotted on top of the plug.



HAL123763

BP Hydraulic  
Setting Tool

## BP Hydraulic Setting Tools

Tool Type and Size in.	Tool Length in. (mm)	Stroke in. (mm)	Working Area in. <sup>2</sup> (mm <sup>2</sup> )	Top Connection Box	Maximum Number of Setting Piston Pins	Collapse Pressure psi (MPa)	Burst Pressure psi (MPa)	Tensile Rating lb (kg)
Non-Fill 4 1/2 to 6 5/8	32.23 (818.6)	14.02 (356.0)	7.601 (4903.9)	2 3/8-in. EUE 8 Rd Box	36	7,013 (48.35)	7,013 (48.35)	54,367 (24 660)
Fill 4 1/2 to 6 5/8	57.48 (1459.9)	14.02 (356.0)	7.601 (4903.9)	2 3/8-in. EUE 8 Rd Box	36	7,013 (48.35)	7,013 (48.35)	54,367 (24 660)
Non-Fill 6 5/8 to 8 5/8	30.68 (779.2)	15.08 (383.0)	11.502 (7420.6)	2 7/8-in. EUE 8 Rd Box	72	14,534 (100.20)	15,531 (107.08)	143,139 (64 926)
Fill 6 5/8 to 8 5/8	54.50 (1384.3)	15.08 (383.0)	11.502 (7420.6)	2 7/8-in. EUE 8 Rd Box	72	14,534 (100.20)	15,531 (107.08)	143,139 (64 926)
Non-Fill 9 5/8 to 20	40.42 (1026.6)	14.44 (366.8)	17.75 (11 451.6)	4 1/2-in. IF (NC 50)	72	11,092 (76.47)	11,788 (81.27)	207,856 (94 281)
Fill 9 5/8 to 20	62.89 (1597.4)	14.44 (366.8)	17.75 (11 451.6)	3 7/8-in. 6 Stub Acme	72	11,092 (76.47)	11,788 (81.27)	207,856 (94 281)

Standard service rating

