



Defyer™ DPA Series

The Weatherford Defyer DPA is a drillable casing bit designed for drilling with casing in medium to medium-hard formations. The DPA series is ideal for high-temperature environments and is rated to 400°F (204°C).

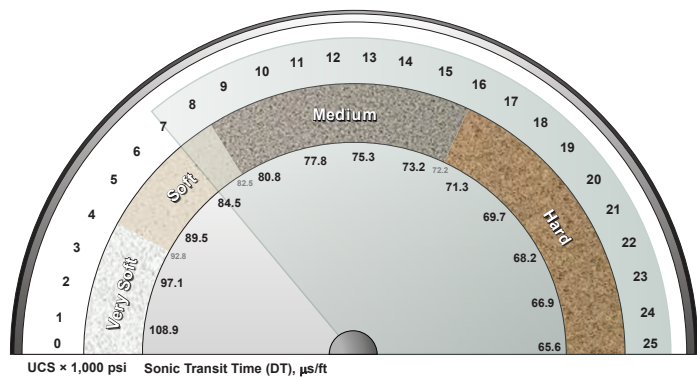
The innovative design of the DPA series includes a selectable blade count and configurable cutter size to suit the formation type and application. The nose is made of aluminum, and the blades are made of a special steel alloy. Polycrystalline-diamond-compact (PDC) cutters are optimally mounted on the face of the tool to maximize drilling efficiency and durability.

Defyer DPA bits can be drilled out with any standard oilfield drill bit. Depending on its DPA central blade count and PDC cutter size, a Defyer DPA bit can be drilled out using a PDC drill bit without sacrificing drillout-bit durability. A range of interchangeable nozzles is available to ensure optimal hydraulics, bit cleaning, and drilling performance. It is simple to remove the nozzles and replace them at the drillsite with Weatherford patented drillable nozzles in either copper or erosion-resistant ceramic variants.



Applications

- Drilling with casing in medium to medium-hard formations
- Drilling with casing or liner over short sections in hard formations
- Drilling or reaming in conductor or intermediate casing strings
- Extending the hole length by reaming liner or casing to bottom and drilling short intervals in conjunction with a drilling-with-liner (DwL™) system or OverDrive™ casing-running system
- Drilling through cement plugs that have been set to isolate losses, pressure, or unstable holes
- Drilling out previous shoe tracks and continuing to drill until the next casing point
- Ensuring casing-seat integrity when reaming liners through unstable hole conditions or cutting beds or in severely swelling formations



Defyer DPA Series
Unconfined Compressive Strength (UCS) Range
7,000 to 25,000 psi



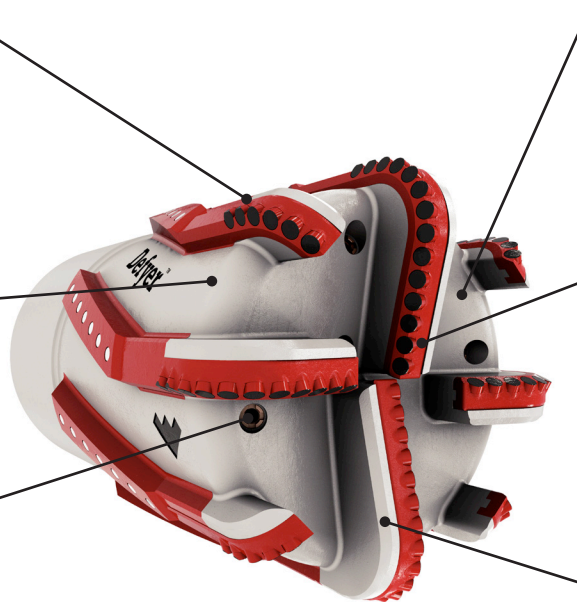
Defyer™ DPA Series

Features, Advantages, and Benefits

The drillout area can be customized by selecting the optimal blade count and cutter size. This ensures that the cutting structure matches the formation type and strength, which eliminates additional costs and materials for drillout.

The steel body meets casing burst and collapse ratings.

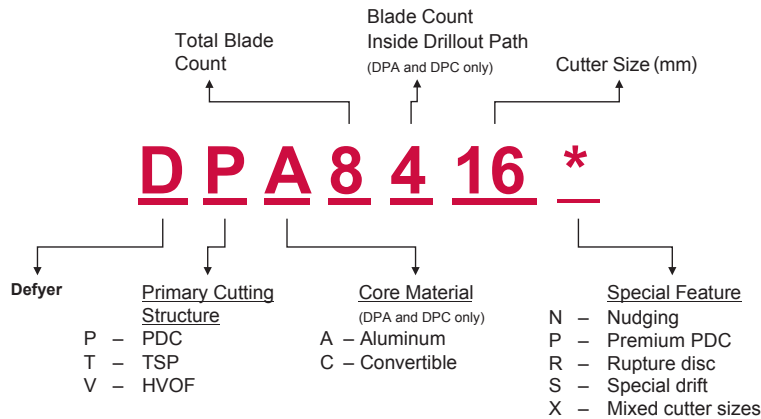
Field-interchangeable, PDC-drillable nozzles provide the required hydraulic horsepower at the bit to improve penetration rates and reduce rig time and costs.



The high-velocity oxy fuel (HVOF) hardfacing in the aluminum surface increases erosion resistance.

The PDC cutting structure has optimized standoff and a wave cutting profile that reduce hole problems and enhance cutting efficiency, rate of penetration, and durability.

Made of aircraft-grade aluminum, the fully drillable center nose section allows rapid, damage-free drillout with conventional PDC bits, roller-cone bits, or another Defyer assembly. This eliminates the need for a special drillout run or retrieval of the bottomhole assembly after drilling to total depth.



Nomenclature for the Defyer DPA series



Defyer™ DPA Series

Specifications

General Data

Nominal size (in.)	7 × 8-1/2	7-5/8 × 8-1/2	7-5/8 × 8-1/2	7-5/8 × 8-1/2	7-5/8 × 9-7/8
Defyer code	DPA5513		DPA4416X	DPA8813X	DPA5513
Casing size (in.)	7	7-5/8			
Casing weight range (lbf/ft, kg/m)	20.0 to 32.0 29.8 to 47.6	33.7 to 39.0 50.1 to 58.0			29.7 to 39.0 50.0 to 58.0
Connection	As requested				
OD (in., mm)	8-1/2 215.9			9-7/8 250.8	
ID below casing connection (in., mm)	Drift diameter + 1.0 mm				
Drillout diameter (in., mm)	6.000 152.40	6.500 165.10			
Drift diameter	To API 5CT				
Tool length (ft, m)	23.60 600.0	23.61 599.6	20.83 529.0		23.63 600.3
Fishing neck length (in., mm)	10.100 253.00	10.059 255.50	9.843 250.00		9.961 253.00
Tool weight (lb, kg)	137 63	120 54	137 63		
IADC code	S333		S222	S432	S333
Number of blades	5		4	8	5
Number of blades inside drillout diameter	5		4	8	5
Number of nozzles	7		6		7
Nozzle type	Type 20 and 300		Type 300		Type 20 and 300
Number of primary face cutters	27		23	43	34
Primary face cutter size (in., mm)	0.53 13.4	0.63 (17), 0.53 (6) 15.9, 13.4		0.53 (37), 0.35 (6) 13.4, 9.0	0.53 13.4
Number of cutters inside drillout diameter	15	17	16	24	17
Cutter size inside drillout diameter (in., mm)	0.53 13.4	0.53 (6), 0.63 (10) 13.4, 15.9		0.35 (6), 0.51 (18) 9.0, 13.0	0.53 13.4
Gauge length (in., mm)	6.14 155.9	6.30 159.9	4.02 102.0		5.96 151.3
Gauge protection	Serrated carbide inserts				
Gauge cutter size (in., mm)	0.53 13.4	0.63 15.9		0.53 13.4	0.53 13.4
Number of gauge cutters	5	5	8	16	10
Face protection	HVOF hardfacing				
Total flow area	Dependent on nozzle selection				
Junk slot area (in. ² , cm ²)	7.6 49.1	4.6 29.5	6.5 41.8		15.1 97.7
Equivalent casing grade (ksi, MPa)	110 758				
Burst (psi, MPa)	12,955 89.00	12,620 87.01	12,620 87.01		
Collapse (psi, MPa)	11,970 83.00	11,080 76.39	11,480 79.15		11,080 76.39
Nose material	Drillable aluminum alloy				



Defyer™ DPA Series

Specifications (continued)

Nominal size (in.)	9-5/8 × 12	9-7/8 × 12	9-5/8 × 12	9-7/8 × 12	9-5/8 × 11-5/8
Defyer code	DPA4413		DPA6413		
Casing size (in.)	9-5/8	9-7/8	9-5/8	9-7/8	9-5/8
Casing weight range (lb/ft, kg/m)	36.0 to 40.0 53.6 to 59.5	62.8 to 66.9 93.5 to 99.6	36.0 to 53.5 53.6 to 79.6	62.8 to 66.9 93.5 to 99.6	36.0 to 53.5 53.6 to 79.6
Connection	As requested				
OD (in., mm)	12 304.8				11-5/8 295.3
ID below casing connection (in., mm)	8.789 223.25	8.515 216.29	8.799 to 8.515 223.50 to 216.29	8.515 216.29	8.799 to 8.515 223.50 to 216.29
Drillout diameter (in., mm)	8.750 222.25	8.500 215.90			
Drift diameter	To API 5CT				
Tool length (ft, m)	26.37 669.9				26.29 667.8
Fishing neck length (in., mm)	10.200 259.00	9.961 253.0			10.200 259.00
Tool weight (lb, kg)	240 109	265 120		258 116	
IADC code	S133		S233		
Number of blades	4		6		
Number of blades inside drillout diameter	4				
Number of nozzles	6		8		
Nozzle type	Type 100 and 200				
Number of primary face cutters	32		42		41
Primary face cutter size (in., mm)	0.53 13.4				
Number of cutters inside drillout diameter	17		19		
Cutter size inside drillout diameter (in., mm)	0.53 13.4				
Gauge length (in., mm)	7.05 179.1				7.24 183.8
Gauge protection	Serrated carbide inserts				
Gauge cutter size (in., mm)	0.53 13.4				
Number of gauge cutters	8		12		
Face protection	HVOF hardfacing				
Total flow area	Dependent on nozzle selection				
Junk slot area (in. ² , cm ²)	20.7 133.0	18.5 119.4		13.8 89.0	
Equivalent casing grade (ksi, MPa)	55 379	110 758			
Burst (psi, MPa)	5,228 36.00	11,276 77.70		10,870 74.90	
Collapse (psi, MPa)	4,742 32.70	10,228 70.50		9,893 68.20	
Nose material	Drillable aluminum alloy				



Defyer™ DPA Series

Specifications (continued)

Nominal size (in.)	9-5/8 × 10-5/8	9-5/8 × 10-5/8	9-5/8 × 12	9-5/8 × 12
Defyer code	DPA4416X	DPA4413		DPA6413
Casing size (in.)	9-5/8			
Casing weight range (lbf/ft, kg/m)	43.5 to 53.5 64.7 to 79.6		36.0 to 53.5 53.6 to 79.6	36.0 to 40.0 53.6 to 59.5
Connection	As requested			
OD (in., mm)	10-5/8 269.9		12 304.8	
ID below casing connection (in., mm)	8.638 to 8.515 219.41 to 216.29		8.799 to 8.515 223.50 to 216.29	8.789 223.25
Drillout diameter (in., mm)	8.500 215.90		8.500 215.90	8.750 222.23
Drift diameter	To API 5CT			
Tool length (ft, m)	22.89 581.4	26.36 669.5	26.37 669.9	26.36 669.5
Fishing neck length (in., mm)	10.35 263.0	10.04 255.0	9.961 253.0	10.04 255.0
Tool weight (lb, kg)	225 102		240 109	265 120
IADC code	S223	S133		S233
Number of blades	4			
Number of blades inside drillout diameter	4			
Number of nozzles	6			8
Nozzle type	Type 200	Type 100 and 200		
Number of primary face cutters	30	28	32	42
Primary face cutter size (in., mm)	0.53 (8), 0.63 (15), 0.35 (7) 13.4, 15.9, 9.0	0.53 13.4		
Number of cutters inside drillout diameter	20	18	17	19
Cutter size inside drillout diameter (in., mm)	0.35 (7), 0.51 (8), 0.63 (4) 9.0, 13.0, 16.0	0.53 13.4		
Gauge length (in., mm)	4.88 124.0	7.44 189.0	7.05 179.1	7.05 179.1
Gauge protection	Serrated carbide inserts			
Gauge cutter size (in., mm)	0.63 15.9	0.53 13.4		
Number of gauge cutters	8			12
Face protection	HVOF hardfacing			
Total flow area	Dependent on nozzle selection			
Junk slot area (in. ² , cm ²)	10.4 66.8	10.0 64.4	20.7 133.0	18.5 119.4
Equivalent casing grade (ksi, MPa)	110 758	80 552	110 758	55 379
Burst (psi, MPa)	10,900 75.20	7,940 54.70	11,276 77.70	5,228 36.00
Collapse (psi, MPa)	8,910 61.40	7,410 51.10	10,228 70.50	4,742 32.70
Nose material	Drillable aluminum alloy			



Defyer™ DPA Series

Specifications (continued)

Nominal size (in.)	9-5/8 × 12	9-7/8 × 12	10-3/4 × 13-1/2	10-3/4 × 13-1/2
Defyer code	DPA4416X			DPA5416X
Casing size (in.)	9-5/8	9-7/8	10-3/4	
Casing weight range (lb/ft, kg/m)	36.0 to 53.5 53.6 to 79.6	62.8 to 66.9 93.5 to 99.6	51.0 to 60.7 75.9 to 90.0	
Connection	As requested			
OD (in., mm)	12 304.8		13-1/2 342.9	
ID below casing connection (in., mm)	8.799 to 8.515 223.50 to 216.29	8.515 216.29	Drift diameter + 1.5 mm	
Drillout diameter (in., mm)	8.500 217.00	8.750 223.50	9.50 241.30	
Drift diameter	To API 5CT			
Tool length (ft, m)	26.43 671.4		30.11 765.0	
Fishing neck length (in., mm)	10.04 255.0		9.88 251.0	
Tool weight (lb, kg)	240 109		650 295	661 300
IADC code	S123		S123	S223
Number of blades	4		4	5
Number of blades inside drillout diameter	4		4	4
Number of nozzles	6		6	7
Nozzle type	Type 100 and 200			
Number of primary face cutters	27		33	37
Primary face cutter size (in., mm)	0.63 (23), 0.53 (4) 15.9, 13.4		0.53 (6), 0.63 (27) 13.4, 15.9	0.53 (6), 0.63 (31) 13.4, 15.9
Number of cutters inside drillout diameter	14		19	
Cutter size inside drillout diameter (in., mm)	0.63 (10), 0.53 (4) 15.9, 13.4		0.53 (6), 0.63 (13) 13.4, 15.9	
Gauge length (in., mm)	7.05 179.1		9.04 229.7	9.09 230.8
Gauge protection	Serrated carbide inserts		Serrated carbide inserts	
Gauge cutter size (in., mm)	0.63 15.9			
Number of gauge cutters	8		8	10
Face protection	HVOF hardfacing			
Total flow area	Dependent on nozzle selection			
Junk slot area (in. ² , cm ²)	20.7 133.0		19.1 123.0	19.4 125.0
Equivalent casing grade (ksi, MPa)	110 758			
Burst (psi, MPa)	11,250 77.60		9,760 67.29	9,610 66.26
Collapse (psi, MPa)	10,220 70.50		8,200 56.53	8,240 56.81
Nose material	Drillable aluminum alloy			



Defyer™ DPA Series

Specifications (continued)

Nominal size (in.)	13-3/8 × 16	13-3/8 × 16	13-3/8 × 16	13-3/8 × 16	13-3/8 × 17	13-3/8 × 17
Defyer code	DPA4416	DPA8416	DPA8413	DPA4413	DPA8516X	DPA4419X
Casing size (in.)	13-3/8					
Casing weight range (lb/ft, kg/m)	54.5 to 72.0 81.1 to 107.1			61.0 to 72.0 90.8 to 107.1		
Connection	As requested					
OD (in., mm)	16 406.4			17 431.8		
ID below casing connection (in., mm)	Drift diameter + 1.5 mm					
Drillout diameter (in., mm)	12.250 311.15					
Drift diameter	To API 5CT					
Tool length (ft, m)	29.54 750.4			30.55 776.1		
Fishing neck length (in., mm)	10.04 255.0			9.84 250.0		
Tool weight (lb, kg)	275 125	305 139		275 125	320 145	300 136
IADC code	S123	S223	S233	S133	S223	S123
Number of blades	4	8		4	8	4
Number of blades inside drillout diameter	4					
Number of nozzles	6					
Nozzle type	Type 100 and 200					
Number of primary face cutters	40	55	63	45	64	35
Primary face cutter size (in., mm)	0.63 15.9		0.53 13.4		0.63 (58), 0.53 (6) 15.9, 13.4	0.75 (29), 0.63 (6) 19.1, 15.9
Number of cutters inside drillout diameter	24					
Cutter size inside drillout diameter (in., mm)	0.63 15.9		0.53 13.4	0.53 13.4	0.63 (22), 0.53 (6) 15.9, 13.4	0.63 (6), 0.75 (15) 15.9, 19.1
Gauge length (in., mm)	8.86 225.0			8.34 211.8		
Gauge protection	Serrated carbide inserts					
Gauge cutter size (in., mm)	0.63 15.9		0.53 13.4		0.63 15.9	0.75 19.1
Number of gauge cutters	8	16		8	16	8
Face protection	HVOF hardfacing					
Total flow area	Dependent on nozzle selection					
Junk slot area (in. ² , cm ²)	39.9 257.6	33.2 214.0		39.9 257.6	46.5 300.0	55.0 354.7
Equivalent casing grade (ksi, MPa)	80 552			110 758		
Burst (psi, MPa)	5,579 38.50			7,565 52.16		
Collapse (psi, MPa)	5,516 36.00			6,911 47.65		
Nose material	Drillable aluminum alloy					



Defyer™ DPA Series

Specifications (continued)

Nominal size (in.)	18-5/8 × 22	20 × 24	20 × 24	20 × 26
Defyer code	DPA8619X	DPA4419X	DPA8419X	DPA8419X
Casing size (in.)	18-5/8	20		
Casing weight range (lbf/ft, kg/m)	87.5 130.2	94.0 to 133.0 139.8 to 197.9	94.0 to 133.0 139.8 to 197.9	
Connection	As requested			
OD (in., mm)	22 558.8	24 609.6		26 660.4
ID below casing connection (in., mm)	17.626 447.7	Drift diameter + 1.5 mm		
Drillout diameter (in., mm)	17.500 444.50			
Drift diameter	To API 5CT			
Tool length (ft, m)	33.681 855.5	33.920 861.6		35.850 910.7
Fishing neck length (in., mm)	10.04 255.0			
Tool weight (lb, kg)	661 300	590 268	661 300	728 330
IADC code	S223	S123	S223	
Number of blades	8	4	8	
Number of blades inside drillout diameter	6	4	5	4
Number of nozzles	14	10	14	
Nozzle type	Type 100 and 200			
Number of primary face cutters	71	56	78	86
Primary face cutter size (in., mm)	0.75 (62), 0.53 (9) 19.1, 13.4	0.75 (47), 0.53 (9) 19.1, 13.4	0.75 (69), 0.53 (9) 19.1, 13.4	0.75 (75), 0.53 (11) 19.1, 13.4
Number of cutters inside drillout diameter	38	34	33	34
Cutter size inside drillout diameter (in., mm)	0.53 (9), 0.75 (29) 13.4, 19.1	0.53 (9), 0.75 (25) 13.4, 19.1	0.53 (9), 0.75 (24) 13.4, 19.1	0.53 (11), 0.75 (23) 13.4, 19.1
Gauge length (in., mm)	10.36 263.2	10.29 261.3		10.91 277.1
Gauge protection	Serrated carbide inserts			
Gauge cutter size (in., mm)	0.75 19.1			
Number of gauge cutters	16	8	16	
Face protection	HVOF hardfacing			
Total flow area	Dependent on nozzle selection			
Junk slot area (in. ² , cm ²)	50.8 327.9	80.8 521.1	68.4 441.1	102.4 660.7
Equivalent casing grade (ksi, MPa)	65 448			
Burst (psi, MPa)	3,130 21.58	3,309 22.80		5,672 39.10
Collapse (psi, MPa)	2,950 20.34	3,107 21.40		5,105 35.20
Nose material	3			



Defyer™ DPA Series

Specifications (continued)

Recommended Operating Parameters

Nominal size (in.)	7 × 8-1/2	7-5/8 × 8-1/2	7-5/8 × 8-1/2	7-5/8 × 8-1/2	7-5/8 × 9-7/8
Defyer code	DPA5513		DPA4416X	DPA8813X	DPA5513
Minimum rotary speed (rpm)	50				
Maximum rotary speed (rpm)	200				
Minimum WOB (lb, kg)	3,000 1,361			4,000 1,814	3,000 1,361
Maximum WOB (lb, kg)	24,000 10,886		21,000 9,526	31,000 14,062	28,000 12,700
Minimum flow rate (gal/min, L/min)	120 454	75 284			200 757
Maximum flow rate (gal/min, L/min)	240 908	140 530	150 568		500 1,514
Minimum torque (ft-lb, N•m)	1,000 1,356				1,200 1,627
Maximum torque (ft-lb, N•m)	90% of maximum connection makeup torque				

Nominal size (in.)	9-5/8 × 12	9-7/8 × 12	9-5/8 × 12	9-7/8 × 12	9-5/8 × 11-5/8
Defyer code	DPA4413		DPA6413		
Minimum rotary speed (rpm)	40				
Maximum rotary speed (rpm)	200				
Minimum WOB (lb, kg)	3,000 1,361		4,000 1,814		
Maximum WOB (lb, kg)	28,000 12,700		37,000 16,783		36,000 16,329
Minimum flow rate (gal/min, L/min)	250 946				200 757
Maximum flow rate (gal/min, L/min)	500 1,893				450 1,703
Minimum torque (ft-lb, N•m)	1,500 2,034				
Maximum torque (ft-lb, N•m)	90% of maximum connection makeup torque				



Defyer™ DPA Series

Specifications (continued)

Nominal size (in.)	9-5/8 × 10-5/8	9-5/8 × 10-5/8	9-5/8 × 12	9-5/8 × 12
Defyer code	DPA4416X	DPA4413		DPA6413
Minimum rotary speed (rpm)	40			
Maximum rotary speed (rpm)	200			
Minimum WOB (lb, kg)	3,000 1,361			4,000 1,814
Maximum WOB (lb, kg)	22,000 9,979	24,000 10,886	28,000 12,700	37,000 16,783
Minimum flow rate (gal/min, L/min)	100 379		250 946	
Maximum flow rate (gal/min, L/min)	210 795		500 1,893	
Minimum torque (ft-lb, N•m)	1,500 2,034			
Maximum torque (ft-lb, N•m)	90% of maximum connection makeup torque			

Nominal size (in.)	9-5/8 × 12	9-7/8 × 12	10-3/4 × 13-1/2	10-3/4 × 13-1/2
Defyer code	DPA4416X			DPA5416X
Minimum rotary speed (rpm)	40		30	
Maximum rotary speed (rpm)	200		200	
Minimum WOB (lb, kg)	3,000 1,361			4,000 1,814
Maximum WOB (lb, kg)	25,000 11,340		30,000 13,608	33,000 14,969
Minimum flow rate (gal/min, L/min)	250 946		350 1,325	
Maximum flow rate (gal/min, L/min)	500 1,893		650 2,461	
Minimum torque (ft-lb, N•m)	1,500 2,034		2,000 2,712	
Maximum torque (ft-lb, N•m)	90% of maximum connection makeup torque			



Defyer™ DPA Series

Specifications (continued)

Nominal size (in.)	13-3/8 × 16	13-3/8 × 16	13-3/8 × 16	13-3/8 × 16	13-3/8 × 17	13-3/8 × 17
Defyer code	DPA4416	DPA8416	DPA8413	DPA4413	DPA8516X	DPA4419X
Minimum rotary speed (rpm)	30					
Maximum rotary speed (rpm)	180				170	
Minimum WOB (lb, kg)	4,000 1,814	6,000 2,721		4,000 1,814	6,000 2,721	5,000 2,270
Maximum WOB (lb, kg)	38,000 17,236	52,000 23,587	55,000 24,947	39,000 17,690	58,000 26,308	44,000 20,000
Minimum flow rate (gal/min, L/min)	400 1,514				550 2,082	
Maximum flow rate (gal/min, L/min)	800 3,028				1,100 4,164	
Minimum torque (ft-lb, N•m)	3,000 4,067				3,500 4,745	
Maximum torque (ft-lb, N•m)	90% of maximum connection makeup torque					

Nominal size (in.)	18-5/8 × 22	20 × 24	20 × 24	20 × 26
Defyer code	DPA8619X	DPA4419X	DPA8419X	DPA8419X
Minimum rotary speed (rpm)	20			
Maximum rotary speed (rpm)	130	120		110
Minimum WOB (lb, kg)	9,000 4,082	7,000 3,175	10,000 4,536	
Maximum WOB (lb, kg)	75,000 34,019	66,000 29,937	75,000 34,019	
Minimum flow rate (gal/min, L/min)	700 2,650	850 3,218		1,000 3,785
Maximum flow rate (gal/min, L/min)	1,400 5,300	1,600 6,057		
Minimum torque (ft-lb, N•m)	3,500 4,745	4,000 5,423		
Maximum torque (ft-lb, N•m)	90% of maximum connection makeup torque			