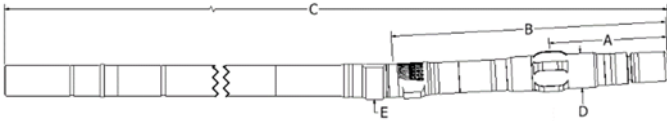


RVDF-50 : 7/8 Lobe 2.6 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	52.8 in
Bit to Bend, Fixed	B	42.3 in
Bit to Top Sub	C	342 in
Body OD, Slick	D	5.06 in
Body OD, Stabilizer	D	5.06 in
Pad Radius, ABH	E	2.66 in
Pad Radius, Fixed	E	2.67 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF Pin 3-1/2 Athens Pin	
Top Connection	3-1/2 REG Box 3-1/2 IF Box 3-1/2 XH Box	
Top Sub Float Bore	2F-3R, 3F, 3-1/2 IF	

Recommended Operating Limits

Max WOB	60,000 lbf
Max Overpull, Backream	87,000 lbf
Max Overpull, Re-Run	125,000 lbf
Max Overpull, POOH	421,000 lbf

Performance Details	HR	XP
Max Diff Pressure	590	650 psi
Max Torque	5,250	5,780 lbf-ft
Stall Torque	7,880	8,670 lbf-ft
Rotation	0.263	0.263 rev/gal
Flow Range	150-300	150-300 gpm
Speed Range	39-79	39-79 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.39	-	-	1.8	2.1	2.3	2.6
0.78	3.6	2.7	1.0	4.6	4.8	5.1
1.15	6.2	5.4	3.7	7.0	7.1	7.5
1.50	8.8	7.9	6.2	9.2	9.4	9.7
1.83	11.1	10.3	8.6	11.3	11.5	11.8
2.12	13.2	12.4	10.7	13.2	13.3	13.7
2.38*	15.1	14.2	12.5	15.1	15.0	15.3
2.60*	16.7	15.8	14.1	16.7	16.4	16.7
2.77*	17.9	17.0	15.3	17.9	17.5	17.8
2.90*	18.8	18.0	16.3	18.8	18.3	18.7
2.97*	19.3	18.5	16.8	19.3	18.8	19.1
3.00*	19.5	18.7	17.0	19.5	19.0	19.3

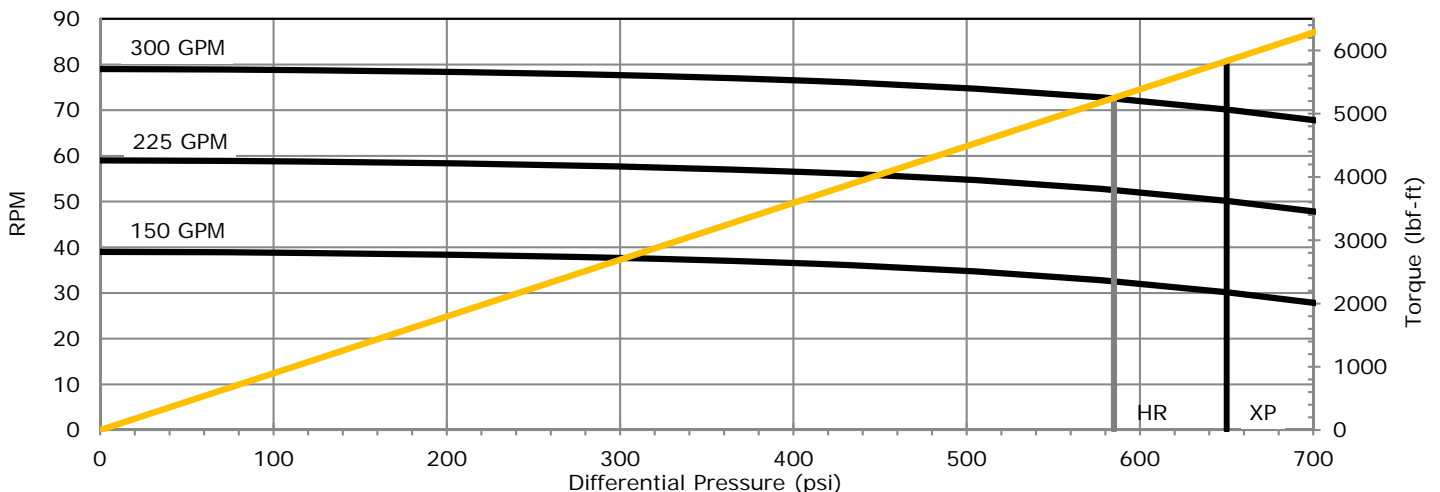
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.75	3.0	2.0	-	4.6	4.8	5.1
1.15	5.9	4.8	2.8	7.3	7.4	7.8
1.50	8.4	7.4	5.3	9.6	9.8	10.1
1.75	10.2	9.2	7.1	11.2	11.4	11.7
1.83	10.8	9.7	7.7	11.8	11.9	12.3
2.00	12.0	10.9	8.9	12.9	13.1	13.4
2.12	12.8	11.8	9.8	13.7	13.9	14.2
2.25*	13.8	12.7	10.7	14.6	14.7	15.1
2.38*	14.7	13.7	11.6	15.4	15.6	15.9
2.50*	15.6	14.5	12.5	16.2	16.4	16.7

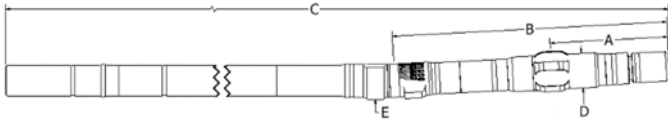
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

RVDF-50 : 7/8 Lobe 3.8 Stage



Dimensions

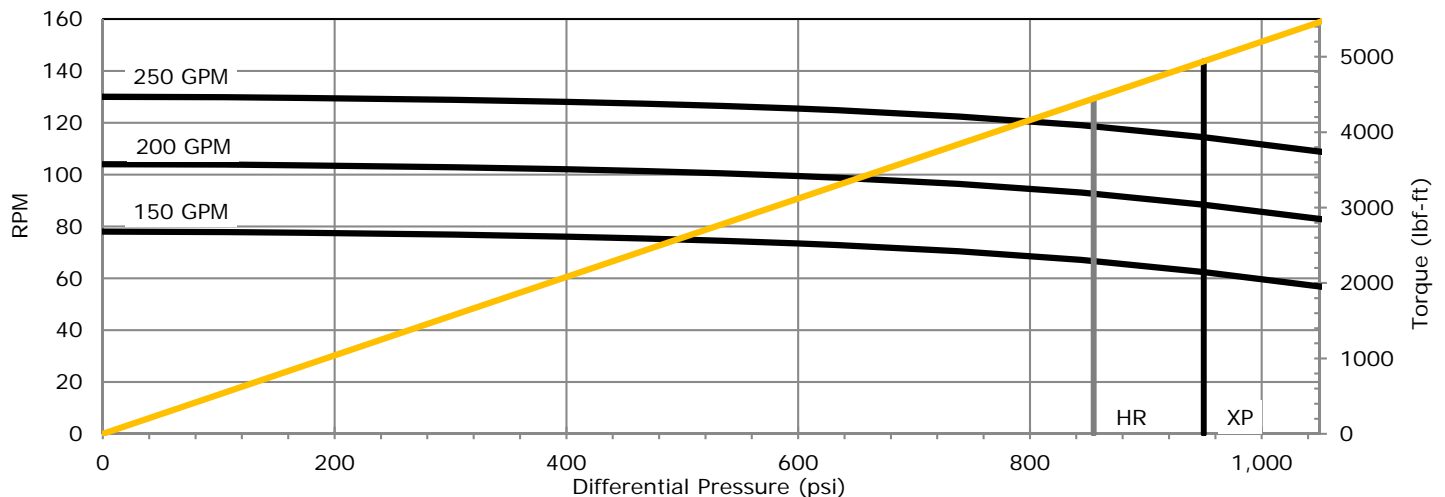
Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	52.8 in
Bit to Bend, Fixed	B	42.3 in
Bit to Top Sub	C	300 in
Body OD, Slick	D	5.06 in
Body OD, Stabilizer	D	5.06 in
Pad Radius, ABH	E	2.66 in
Pad Radius, Fixed	E	2.67 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF Pin 3-1/2 Athens Pin	
Top Connection	3-1/2 REG Box 3-1/2 IF Box 3-1/2 XH Box	
Top Sub Float Bore	2F-3R, 3F, 3-1/2 IF	

Recommended Operating Limits

Max WOB	60,000 lbf
Max Overpull, Backream	87,000 lbf
Max Overpull, Re-Run	125,000 lbf
Max Overpull, POOH	421,000 lbf

Performance Details	HR	XP
Max Diff Pressure	860	950 psi
Max Torque	4,450	4,900 lbf-ft
Stall Torque	6,670	7,340 lbf-ft
Rotation	0.521	0.521 rev/gal
Flow Range	150-250	150-250 gpm
Speed Range	78-140	78-140 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.39	-	-	-	2.5	2.7	3.1
0.78	4.2	3.2	1.2	5.3	5.5	5.9
1.15	7.2	6.2	4.3	7.9	8.2	8.6
1.50	10.1	9.1	7.2	10.4	10.7	11.1
1.83	12.8	11.8	9.9	12.8	13.0	13.5
2.12	15.2	14.2	12.3	15.2	15.1	15.6
2.38*	17.3	16.4	14.4	17.3	17.0	17.4
2.60*	19.1	18.2	16.2	19.1	18.6	19.0
2.77*	20.5	19.6	17.6	20.5	19.8	20.2
2.90*	21.6	20.6	18.7	21.6	20.7	21.1
2.97*	22.2	21.2	19.3	22.2	21.2	21.6
3.00*	22.4	21.4	19.5	22.4	21.4	21.9

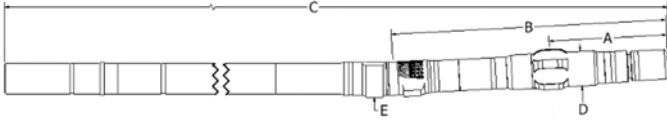
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.75	3.5	2.3	-	5.3	5.5	6.0
1.15	6.8	5.6	3.3	8.3	8.5	9.0
1.50	9.6	8.5	6.1	10.9	11.2	11.6
1.75	11.7	10.5	8.2	12.8	13.0	13.5
1.83	12.4	11.2	8.8	13.4	13.6	14.1
2.00	13.8	12.6	10.2	14.7	14.9	15.4
2.12	14.7	13.6	11.2	15.6	15.8	16.2
2.25*	15.8	14.6	12.3	16.6	16.8	17.2
2.38*	16.9	15.7	13.4	17.5	17.8	18.2
2.50*	17.9	16.7	14.4	18.4	18.7	19.1

*Bend Setting not recommended for Rotary Drilling

RVDF-50 : 7/8 Lobe 8.4 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	52.8 in
Bit to Bend, Fixed	B	42.3 in
Bit to Top Sub	C	363 in
Body OD, Slick	D	5.06 in
Body OD, Stabilizer	D	5.06 in
Pad Radius, ABH	E	2.66 in
Pad Radius, Fixed	E	2.67 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF Pin 3-1/2 Athens Pin	
Top Connection	3-1/2 REG Box 3-1/2 IF Box 3-1/2 XH Box	
Top Sub Float Bore	2F-3R, 3F, 3-1/2 IF	

Recommended Operating Limits

Max WOB	60,000 lbf
Max Overpull, Backream	87,000 lbf
Max Overpull, Re-Run	125,000 lbf
Max Overpull, POOH	421,000 lbf

Performance Details	HR	XP
Max Diff Pressure	1,890	2,080 psi
Max Torque	6,860	7,550 lbf-ft
Stall Torque	10,290	11,320 lbf-ft
Rotation	0.700	0.700 rev/gal
Flow Range	150-350	150-350 gpm
Speed Range	105-250	105-250 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.39	-	-	-	2.0	2.1	2.4
0.78	3.4	2.6	1.0	4.3	4.5	4.8
1.15	5.9	5.1	3.5	6.6	6.7	7.0
1.50	8.2	7.4	5.8	8.7	8.9	9.2
1.83	10.5	9.7	8.1	10.7	10.9	11.2
2.12	12.4	11.6	10.0	12.5	12.6	12.9
2.38*	14.2	13.4	11.8	14.2	14.2	14.5
2.60*	15.7	14.9	13.3	15.7	15.5	15.8
2.77*	16.8	16.0	14.4	16.8	16.6	16.9
2.90*	17.7	16.9	15.3	17.7	17.3	17.6
2.97*	18.2	17.4	15.8	18.2	17.8	18.1
3.00*	18.4	17.6	16.0	18.4	18.0	18.2

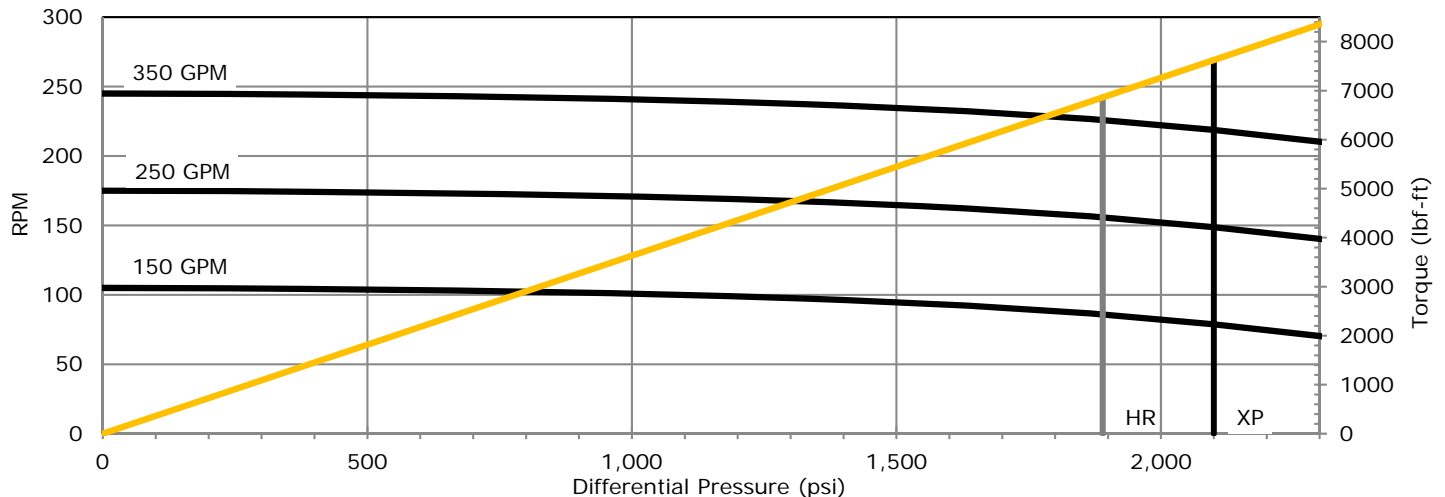
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.75	2.8	1.8	-	4.3	4.5	4.8
1.15	5.5	4.5	2.6	6.8	7.0	7.3
1.50	7.9	6.9	5.0	9.0	9.2	9.5
1.75	9.6	8.6	6.7	10.6	10.8	11.1
1.83	10.1	9.1	7.2	11.1	11.3	11.6
2.00	11.3	10.3	8.4	12.2	12.3	12.6
2.12	12.1	11.1	9.2	12.9	13.1	13.4
2.25*	12.9	12.0	10.1	13.7	13.9	14.2
2.38*	13.8	12.9	10.9	14.6	14.7	15.0
2.50*	14.6	13.7	11.7	15.3	15.5	15.8

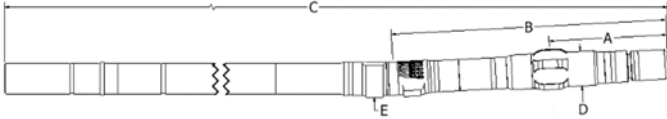
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

RVDF-52 : 7/8 Lobe 6.8 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	52.8 in
Bit to Bend, Fixed	B	42.3 in
Bit to Top Sub	C	383 in
Body OD, Slick	D	5.25 in
Body OD, Stabilizer	D	5.25 in
Pad Radius, ABH	E	2.66 in
Pad Radius, Fixed	E	2.67 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF Pin 3-1/2 Athens Pin	
Top Connection	3-1/2 REG Box 3-1/2 IF Box 3-1/2 XH Box	
Top Sub Float Bore	2F-3R, 3F, 3-1/2 IF	

Recommended Operating Limits

Max WOB	60,000 lbf
Max Overpull, Backream	87,000 lbf
Max Overpull, Re-Run	125,000 lbf
Max Overpull, POOH	421,000 lbf

Performance Details	HR	XP
Max Diff Pressure	1,530	1,680 psi
Max Torque	8,460	9,310 lbf-ft
Stall Torque	12,690	13,960 lbf-ft
Rotation	0.460	0.460 rev/gal
Flow Range	175-375	175-375 gpm
Speed Range	80-180	80-180 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.39	-	-	-	2.9	3.2	3.7
0.78	4.1	3.1	1.0	6.0	6.2	6.8
1.15	7.3	6.3	4.3	8.9	9.1	9.7
1.50	10.4	9.4	7.3	11.6	11.9	12.4
1.83	13.3	12.3	10.2	14.2	14.5	15.0
2.12	15.8	14.8	12.7	16.5	16.8	17.3
2.38*	18.1	17.1	15.0	18.6	18.8	19.3
2.60*	20.0	19.0	16.9	20.3	20.5	21.1
2.77*	21.5	20.5	18.4	21.6	21.9	22.4
2.90*	22.6	21.6	19.5	22.6	22.9	23.4
2.97*	23.2	22.2	20.2	23.2	23.5	24.0
3.00*	23.5	22.5	20.4	23.5	23.7	24.2

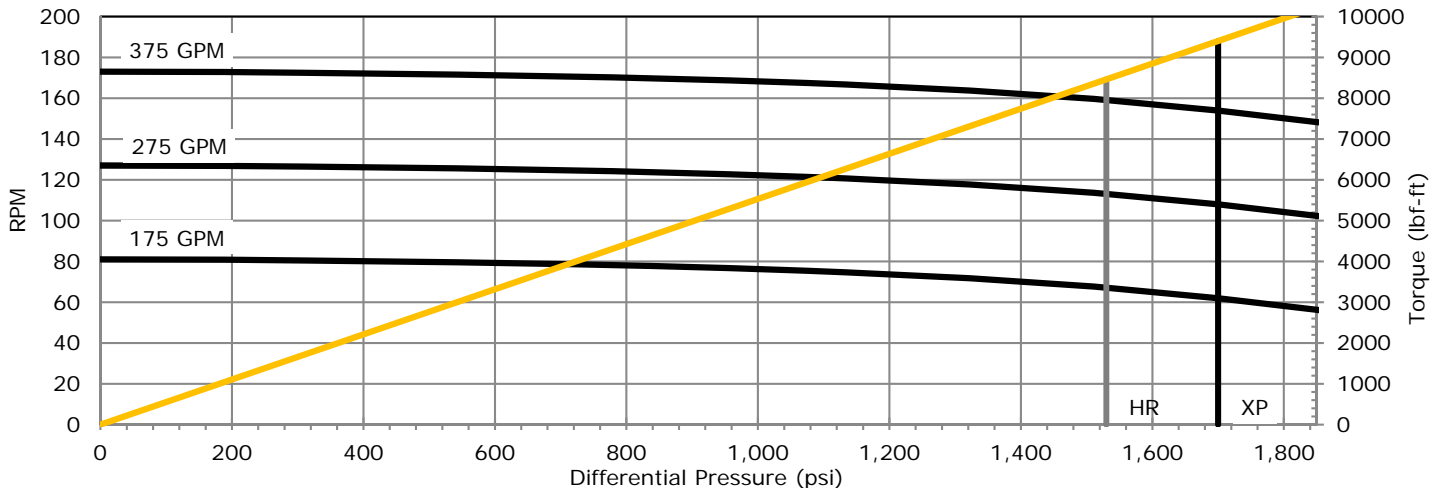
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.75	3.4	2.2	-	6.0	6.3	6.8
1.15	6.9	5.7	3.2	9.3	9.6	10.1
1.50	10.0	8.7	6.3	12.2	12.5	13.0
1.75	12.2	10.9	8.4	14.3	14.5	15.1
1.83	12.9	11.6	9.1	14.9	15.2	15.7
2.00	14.4	13.1	10.6	16.3	16.6	17.1
2.12	15.4	14.2	11.7	17.3	17.6	18.1
2.25*	16.5	15.3	12.8	18.4	18.7	19.2
2.38*	17.7	16.4	13.9	19.5	19.7	20.3
2.50*	18.7	17.5	15.0	20.5	20.7	21.2

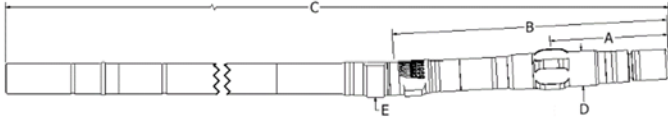
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

RVDF-70 : 4/5 Lobe 7.0 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	336 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

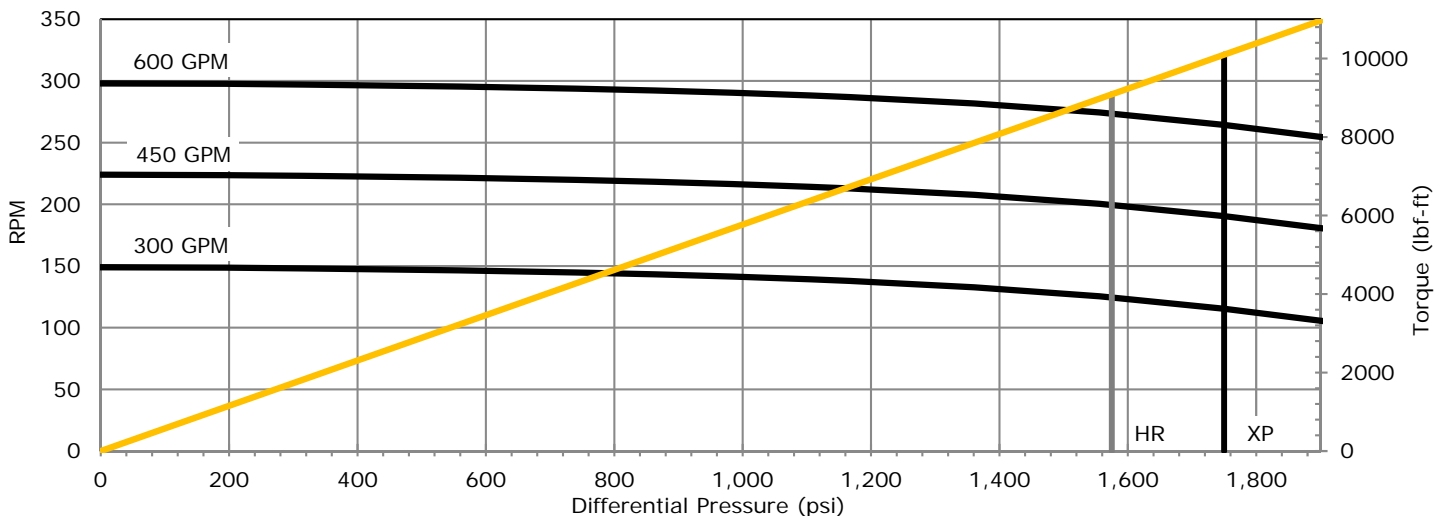
Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	1,580	1,740 psi
Max Torque	9,090	10,000 lbf-ft
Stall Torque	13,630	15,000 lbf-ft
Rotation	0.497	0.497 rev/gal
Flow Range	300-600	300-600 gpm
Speed Range	149-300	149-300 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4
0.39	-	-	-	2.6	3.0	3.5
0.78	3.3	2.7	-	5.0	5.5	5.9
1.15	5.9	5.2	2.5	7.2	7.9	8.1
1.50	8.3	7.7	4.9	9.3	10.1	10.2
1.83	10.6	9.9	7.2	11.3	12.2	12.2
2.12	12.6	12.0	9.2	13.0	14.1	13.9
2.38*	14.4	13.7	11.0	14.6	15.8	15.5
2.60*	15.9	15.3	12.5	15.9	17.2	16.8
2.77*	17.1	16.4	13.7	17.1	18.3	17.8
2.90*	18.0	17.3	14.6	18.0	19.1	18.6
2.97*	18.4	17.8	15.0	18.4	19.6	19.0
3.00*	18.6	18.0	15.3	18.6	19.8	19.2

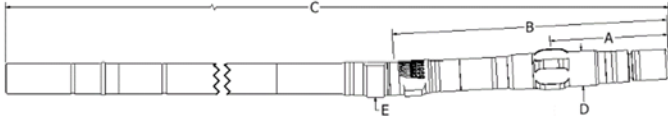
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4
0.75	2.3	1.5	-	5.1	5.3	6.0
1.00	4.0	3.2	-	6.7	6.9	7.6
1.25	5.7	4.9	1.3	8.3	8.5	9.2
1.50	7.5	6.7	3.0	10.0	10.1	10.8
1.63	8.4	7.6	3.9	10.8	11.0	11.7
1.75	9.2	8.4	4.7	11.6	11.7	12.5
1.88	10.1	9.3	5.6	12.4	12.6	13.3
2.00	10.9	10.1	6.5	13.2	13.3	14.1
2.25*	12.7	11.8	8.2	14.8	15.0	15.7
2.38*	13.6	12.7	9.1	15.6	15.8	16.5
2.50*	14.4	13.6	9.9	16.4	16.6	17.3

*Bend Setting not recommended for Rotary Drilling

RVDF-70 : 5/6 Lobe 8.2 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	372 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

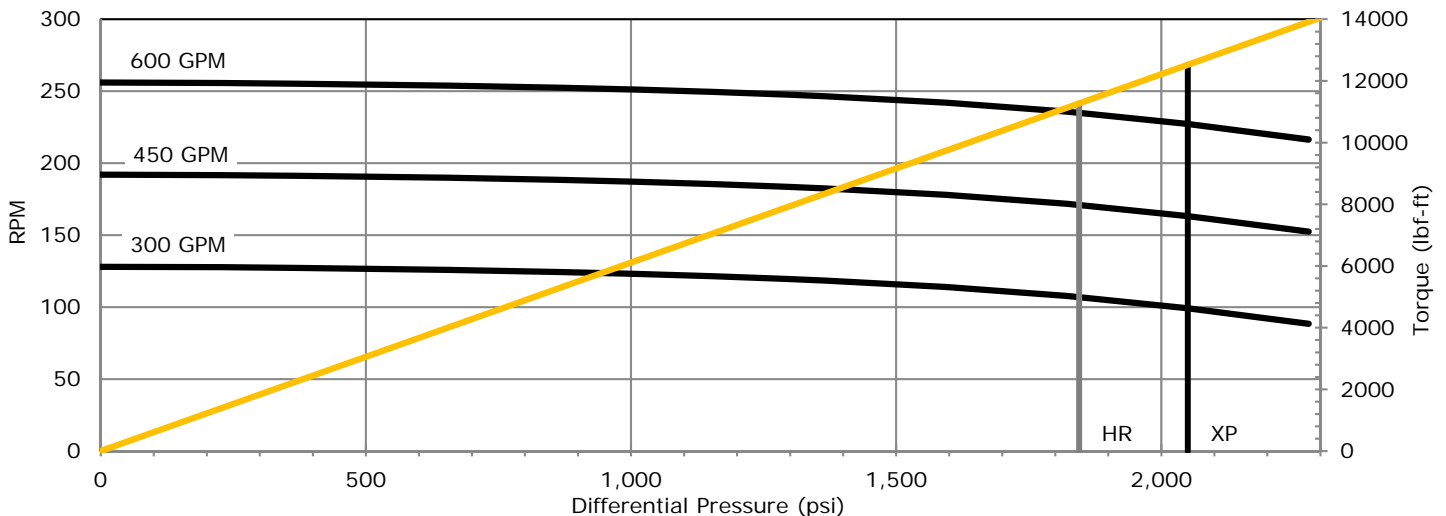
Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	1,850	2,035 psi
Max Torque	11,270	12,400 lbf-ft
Stall Torque	16,910	18,600 lbf-ft
Rotation	0.426	0.426 rev/gal
Flow Range	300-600	300-600 gpm
Speed Range	127-260	127-260 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4
0.39	-	-	-	2.3	2.5	3.0
0.78	3.0	2.4	-	4.5	4.6	5.2
1.15	5.3	4.7	2.2	6.5	6.7	7.3
1.50	7.5	6.9	4.4	8.5	8.6	9.2
1.83	9.5	9.0	6.5	10.3	10.4	11.0
2.12	11.3	10.8	8.3	11.9	12.0	12.6
2.38*	13.0	12.4	9.9	13.3	13.5	14.1
2.60*	14.3	13.8	11.3	14.6	14.7	15.3
2.77*	15.4	14.9	12.3	15.5	15.6	16.2
2.90*	16.2	15.7	13.2	16.2	16.3	16.9
2.97*	16.7	16.1	13.6	16.7	16.7	17.3
3.00*	16.8	16.3	13.8	16.8	16.9	17.5

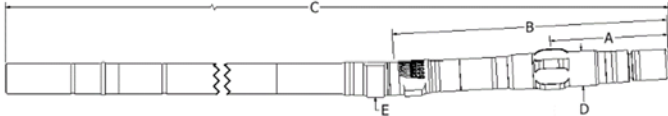
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4
0.75	2.0	1.3	-	4.6	4.7	5.3
1.00	3.6	2.9	-	6.1	6.2	6.8
1.25	5.2	4.4	1.1	7.5	7.7	8.2
1.50	6.7	6.0	2.7	9.0	9.1	9.7
1.63	7.5	6.8	3.5	9.8	9.9	10.5
1.75	8.3	7.6	4.3	10.5	10.6	11.2
1.88	9.1	8.4	5.1	11.2	11.4	12.0
2.00	9.9	9.1	5.8	11.9	12.1	12.7
2.25*	11.4	10.7	7.4	13.4	13.5	14.1
2.38*	12.2	11.5	8.2	14.2	14.3	14.9
2.50*	13.0	12.3	9.0	14.9	15.0	15.6

*Bend Setting not recommended for Rotary Drilling

RVDF-70 : 7/8 Lobe 3.5 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	386 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

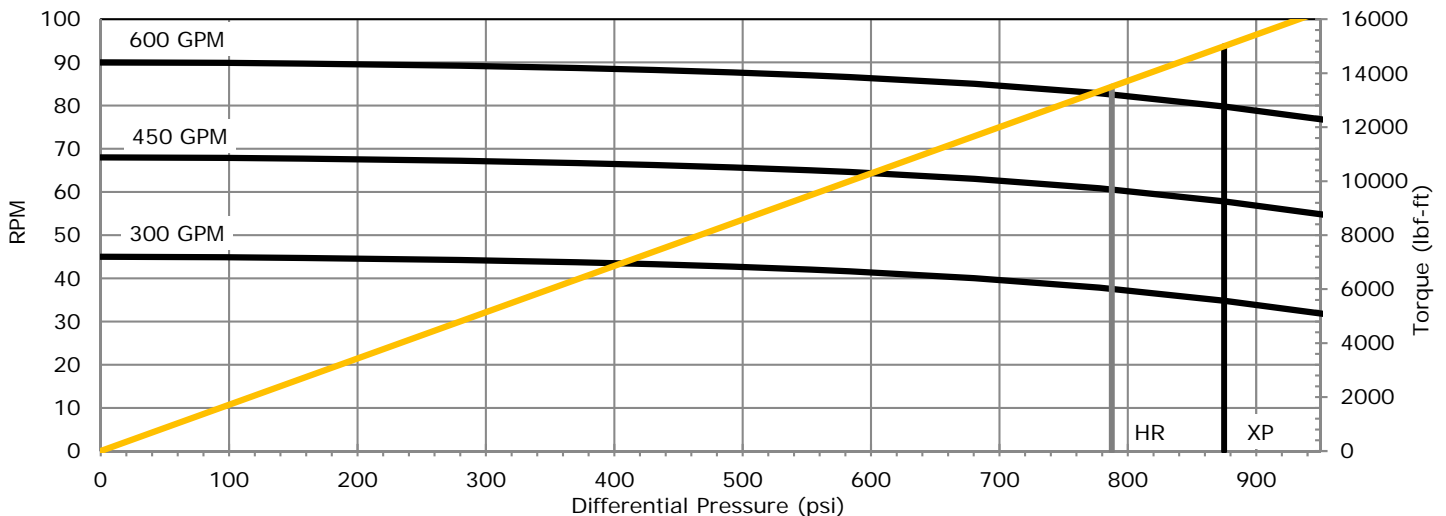
Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	790	870 psi
Max Torque	13,500	14,850 lbf-ft
Stall Torque	20,250	22,280 lbf-ft
Rotation	0.150	0.150 rev/gal
Flow Range	300-600	300-600 gpm
Speed Range	45-90	45-90 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4
0.39	-	-	-	2.2	2.3	2.9
0.78	2.8	2.3	-	4.3	4.4	5.0
1.15	5.1	4.5	2.1	6.3	6.4	7.0
1.50	7.2	6.6	4.2	8.2	8.3	8.9
1.83	9.2	8.6	6.2	10.0	10.1	10.6
2.12	10.9	10.4	8.0	11.5	11.6	12.2
2.38*	12.5	12.0	9.5	12.9	13.0	13.6
2.60*	13.8	13.3	10.9	14.1	14.2	14.7
2.77*	14.9	14.3	11.9	15.0	15.1	15.7
2.90*	15.6	15.1	12.7	15.7	15.8	16.4
2.97*	16.1	15.5	13.1	16.1	16.2	16.7
3.00*	16.2	15.7	13.3	16.2	16.3	16.9

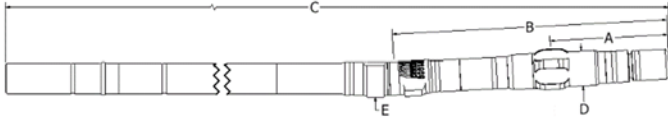
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4
0.75	2.0	1.2	-	4.4	4.5	5.1
1.00	3.5	2.8	-	5.8	6.0	6.5
1.25	5.0	4.3	1.1	7.3	7.4	7.9
1.50	6.5	5.8	2.6	8.7	8.8	9.3
1.63	7.3	6.6	3.4	9.4	9.5	10.1
1.75	8.0	7.3	4.1	10.1	10.2	10.8
1.88	8.8	8.1	4.9	10.8	11.0	11.5
2.00	9.5	8.8	5.6	11.5	11.6	12.2
2.25*	11.0	10.3	7.1	12.9	13.1	13.6
2.38*	11.8	11.1	7.9	13.7	13.8	14.3
2.50*	12.5	11.8	8.6	14.4	14.5	15.0

*Bend Setting not recommended for Rotary Drilling

RVDF-70 : 7/8 Lobe 5.0 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	321 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

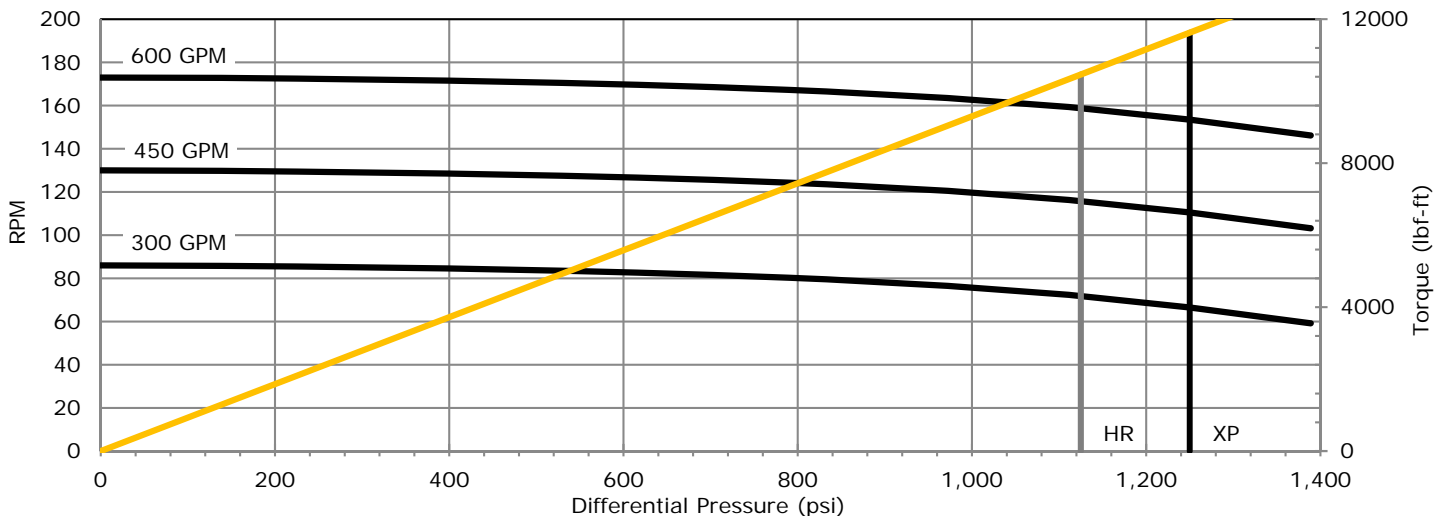
Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	1,130	1,240 psi
Max Torque	10,460	11,510 lbf-ft
Stall Torque	15,690	17,260 lbf-ft
Rotation	0.288	0.288 rev/gal
Flow Range	300-600	300-600 gpm
Speed Range	86-180	86-180 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
0.39	-	-	-	2.8	3.0	3.8
0.78	3.5	2.8	-	5.2	5.4	6.2
1.15	6.2	5.5	2.6	7.5	7.7	8.5
1.50	8.7	8.0	5.1	9.7	9.9	10.7
1.83	11.1	10.4	7.5	11.8	11.9	12.7
2.12	13.2	12.5	9.6	13.6	13.8	14.6
2.38*	15.1	14.4	11.5	15.2	15.4	16.2
2.60*	16.6	16.0	13.1	16.6	16.8	17.5
2.77*	17.9	17.2	14.3	17.9	17.8	18.6
2.90*	18.8	18.2	15.3	18.8	18.6	19.4
2.97*	19.3	18.7	15.8	19.3	19.1	19.9
3.00*	19.5	18.9	16.0	19.5	19.2	20.0

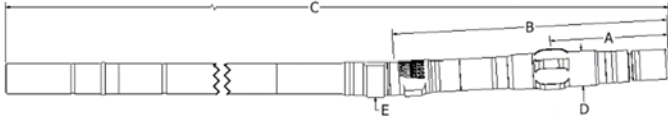
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
0.75	2.4	1.6	-	5.4	5.6	6.4
1.00	4.2	3.4	-	7.1	7.2	8.0
1.25	6.0	5.2	1.4	8.8	8.9	9.7
1.50	7.8	7.0	3.2	10.4	10.6	11.4
1.63	8.8	7.9	4.1	11.3	11.5	12.3
1.75	9.7	8.8	5.0	12.1	12.3	13.1
1.88	10.6	9.7	5.9	13.0	13.2	14.0
2.00	11.5	10.6	6.8	13.8	14.0	14.8
2.25*	13.3	12.4	8.6	15.5	15.7	16.4
2.38*	14.2	13.4	9.5	16.3	16.5	17.3
2.50*	15.1	14.2	10.4	17.2	17.3	18.1

*Bend Setting not recommended for Rotary Drilling

RVDF-70 : 7/8 Lobe 5.7 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	386 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

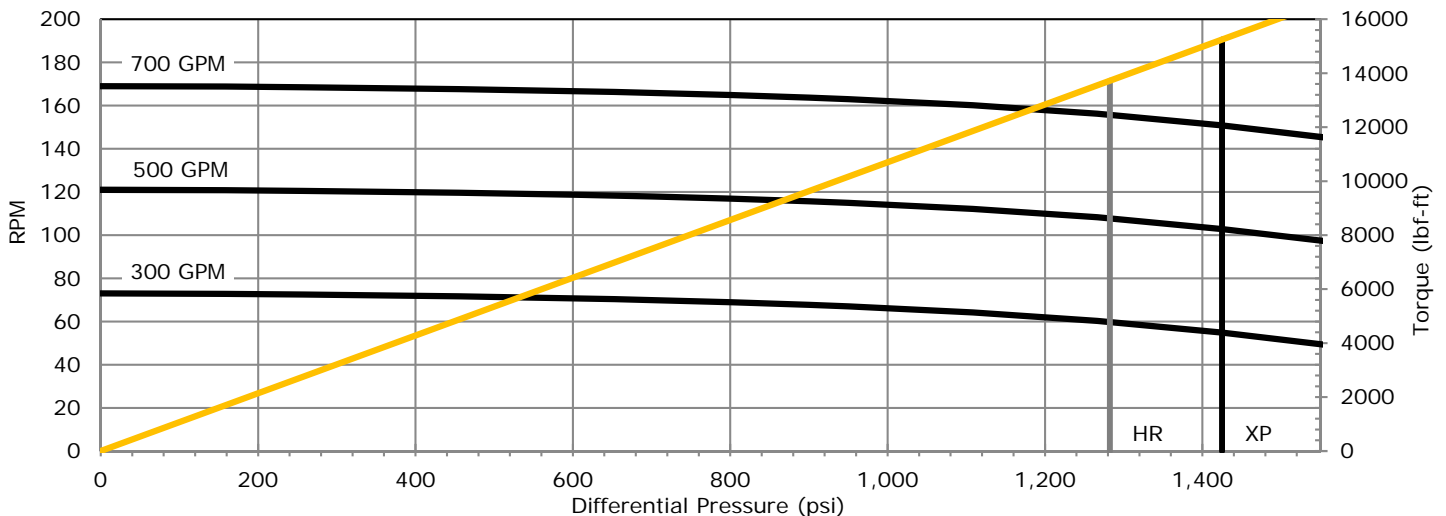
Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	1,280	1,430 psi
Max Torque	13,720	15,240 lbf-ft
Stall Torque	20,580	22,870 lbf-ft
Rotation	0.242	0.242 rev/gal
Flow Range	300-700	300-700 gpm
Speed Range	72-169	72-169 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
Deg						
0.39	-	-	-	2.2	2.3	2.9
0.78	2.8	2.3	-	4.3	4.4	5.0
1.15	5.1	4.5	2.1	6.3	6.4	7.0
1.50	7.2	6.6	4.2	8.2	8.3	8.9
1.83	9.2	8.6	6.2	10.0	10.1	10.6
2.12	10.9	10.4	8.0	11.5	11.6	12.2
2.38*	12.5	12.0	9.5	12.9	13.0	13.6
2.60*	13.8	13.3	10.9	14.1	14.2	14.7
2.77*	14.9	14.3	11.9	15.0	15.1	15.7
2.90*	15.6	15.1	12.7	15.7	15.8	16.4
2.97*	16.1	15.5	13.1	16.1	16.2	16.7
3.00*	16.2	15.7	13.3	16.2	16.3	16.9

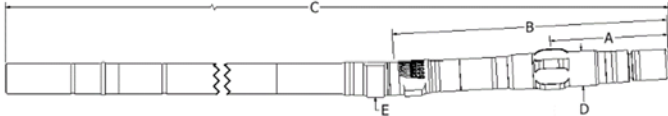
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
Deg						
0.75	2.0	1.2	-	4.4	4.5	5.1
1.00	3.5	2.8	-	5.8	6.0	6.5
1.25	5.0	4.3	1.1	7.3	7.4	7.9
1.50	6.5	5.8	2.6	8.7	8.8	9.3
1.63	7.3	6.6	3.4	9.4	9.5	10.1
1.75	8.0	7.3	4.1	10.1	10.2	10.8
1.88	8.8	8.1	4.9	10.8	11.0	11.5
2.00	9.5	8.8	5.6	11.5	11.6	12.2
2.25*	11.0	10.3	7.1	12.9	13.1	13.6
2.38*	11.8	11.1	7.9	13.7	13.8	14.3
2.50*	12.5	11.8	8.6	14.4	14.5	15.0

*Bend Setting not recommended for Rotary Drilling

RVDF-70 : 7/8 Lobe 6.8 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	372 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

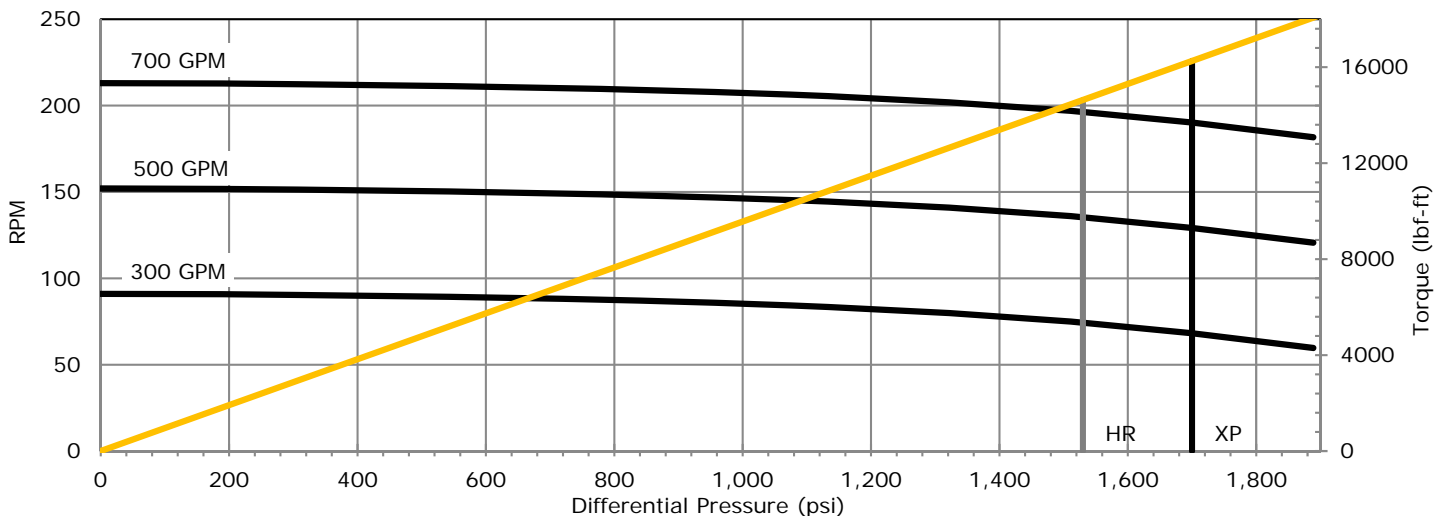
Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	1,530	1,700 psi
Max Torque	14,630	16,260 lbf-ft
Stall Torque	21,950	24,390 lbf-ft
Rotation	0.304	0.304 rev/gal
Flow Range	300-700	300-700 gpm
Speed Range	91-213	91-213 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
Deg						
0.39	-	-	-	2.3	2.5	3.0
0.78	3.0	2.4	-	4.5	4.6	5.2
1.15	5.3	4.7	2.2	6.5	6.7	7.3
1.50	7.5	6.9	4.4	8.5	8.6	9.2
1.83	9.5	9.0	6.5	10.3	10.4	11.0
2.12	11.3	10.8	8.3	11.9	12.0	12.6
2.38*	13.0	12.4	9.9	13.3	13.5	14.1
2.60*	14.3	13.8	11.3	14.6	14.7	15.3
2.77*	15.4	14.9	12.3	15.5	15.6	16.2
2.90*	16.2	15.7	13.2	16.2	16.3	16.9
2.97*	16.7	16.1	13.6	16.7	16.7	17.3
3.00*	16.8	16.3	13.8	16.8	16.9	17.5

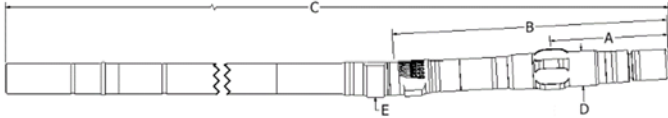
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
Deg						
0.75	2.0	1.3	-	4.6	4.7	5.3
1.00	3.6	2.9	-	6.1	6.2	6.8
1.25	5.2	4.4	1.1	7.5	7.7	8.2
1.50	6.7	6.0	2.7	9.0	9.1	9.7
1.63	7.5	6.8	3.5	9.8	9.9	10.5
1.75	8.3	7.6	4.3	10.5	10.6	11.2
1.88	9.1	8.4	5.1	11.2	11.4	12.0
2.00	9.9	9.1	5.8	11.9	12.1	12.7
2.25*	11.4	10.7	7.4	13.4	13.5	14.1
2.38*	12.2	11.5	8.2	14.2	14.3	14.9
2.50*	13.0	12.3	9.0	14.9	15.0	15.6

*Bend Setting not recommended for Rotary Drilling

RVDF-70 : 7/8 Lobe 6.8 Stage XP



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	372 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

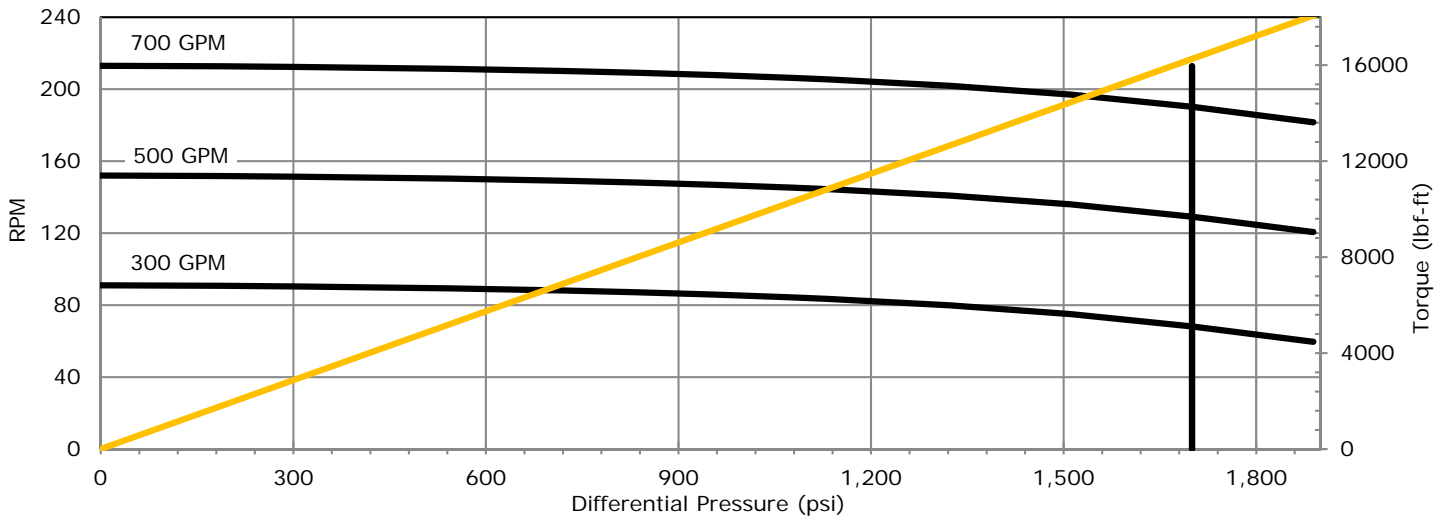
Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

Max Diff Pressure	1,700 psi
Max Torque	16,260 lbf-ft
Stall Torque	24,390 lbf-ft
Rotation	0.304 rev/gal
Flow Range	300-700 gpm
Speed Range	91-213 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

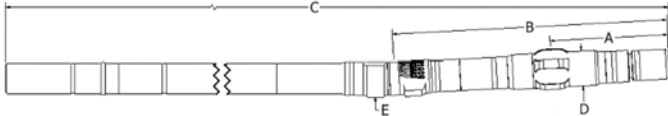
Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
0.39	-	-	-	2.3	2.5	3.0
0.78	3.0	2.4	-	4.5	4.6	5.2
1.15	5.3	4.7	2.2	6.5	6.7	7.3
1.50	7.5	6.9	4.4	8.5	8.6	9.2
1.83	9.5	9.0	6.5	10.3	10.4	11.0
2.12	11.3	10.8	8.3	11.9	12.0	12.6
2.38*	13.0	12.4	9.9	13.3	13.5	14.1
2.60*	14.3	13.8	11.3	14.6	14.7	15.3
2.77*	15.4	14.9	12.3	15.5	15.6	16.2
2.90*	16.2	15.7	13.2	16.2	16.3	16.9
2.97*	16.7	16.1	13.6	16.7	16.7	17.3
3.00*	16.8	16.3	13.8	16.8	16.9	17.5

*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
0.75	2.0	1.3	-	4.6	4.7	5.3
1.00	3.6	2.9	-	6.1	6.2	6.8
1.25	5.2	4.4	1.1	7.5	7.7	8.2
1.50	6.7	6.0	2.7	9.0	9.1	9.7
1.63	7.5	6.8	3.5	9.8	9.9	10.5
1.75	8.3	7.6	4.3	10.5	10.6	11.2
1.88	9.1	8.4	5.1	11.2	11.4	12.0
2.00	9.9	9.1	5.8	11.9	12.1	12.7
2.25*	11.4	10.7	7.4	13.4	13.5	14.1
2.38*	12.2	11.5	8.2	14.2	14.3	14.9
2.50*	13.0	12.3	9.0	14.9	15.0	15.6

*Bend Setting not recommended for Rotary Drilling

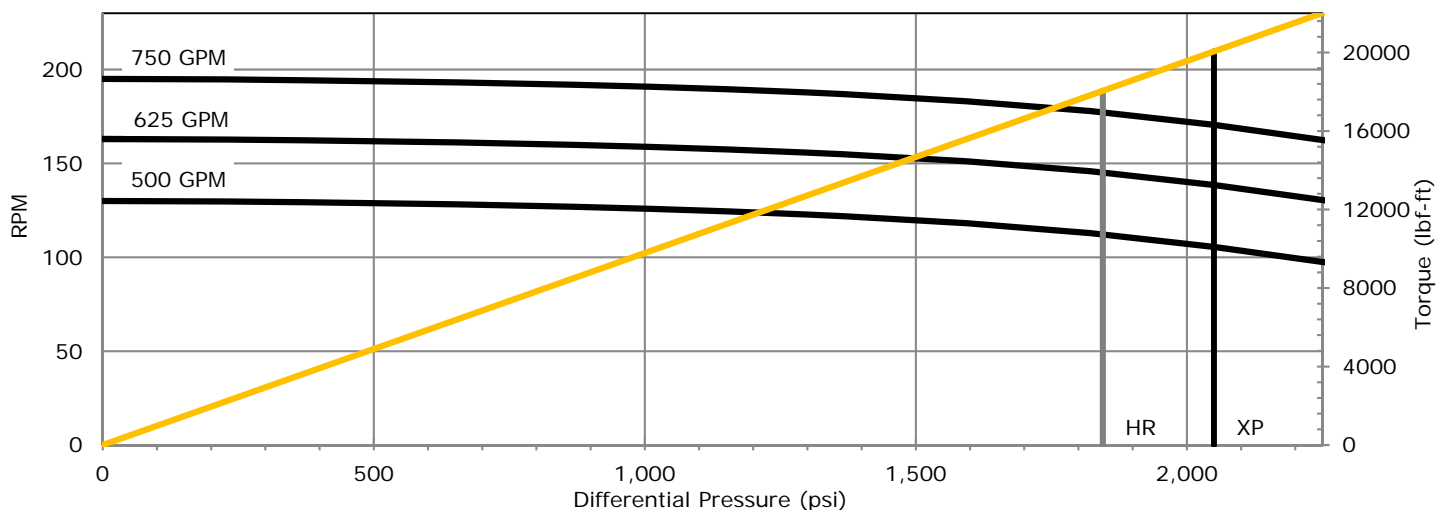
RVDF-70 : 7/8 Lobe 8.2 Stage

Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	426 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details	HR	XP
Max Diff Pressure	1,850	2,040 psi
Max Torque	18,050	19,860 lbf-ft
Stall Torque	27,070	29,780 lbf-ft
Rotation	0.260	0.260 rev/gal
Flow Range	500-750	500-750 gpm
Speed Range	130-200	130-200 rpm

Theoretical Performance Curve


Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
Deg						
0.39	-	-	-	2.0	2.1	2.5
0.78	2.5	2.1	-	3.9	4.0	4.5
1.15	4.6	4.1	1.9	5.7	5.8	6.3
1.50	6.5	6.0	3.8	7.5	7.6	8.0
1.83	8.3	7.8	5.6	9.1	9.2	9.6
2.12	9.9	9.4	7.2	10.5	10.6	11.1
2.38*	11.3	10.8	8.6	11.8	11.9	12.4
2.60*	12.5	12.0	9.8	12.9	13.0	13.4
2.77*	13.5	13.0	10.8	13.7	13.8	14.3
2.90*	14.2	13.7	11.5	14.4	14.5	14.9
2.97*	14.6	14.1	11.9	14.7	14.8	15.3
3.00*	14.7	14.2	12.0	14.9	15.0	15.4

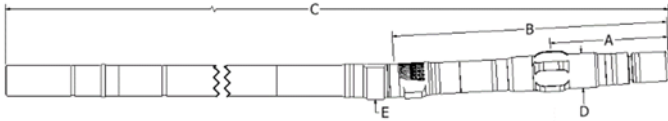
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
Deg						
0.75	1.7	1.1	-	4.0	4.1	4.5
1.00	3.1	2.5	-	5.3	5.4	5.8
1.25	4.5	3.9	-	6.6	6.7	7.1
1.50	5.9	5.2	2.3	7.9	8.0	8.4
1.63	6.6	5.9	3.0	8.5	8.6	9.1
1.75	7.2	6.6	3.7	9.2	9.3	9.7
1.88	8.0	7.3	4.4	9.8	9.9	10.4
2.00	8.6	8.0	5.1	10.5	10.6	11.0
2.25*	10.0	9.3	6.4	11.8	11.9	12.3
2.38*	10.7	10.1	7.2	12.4	12.5	13.0
2.50*	11.4	10.7	7.8	13.1	13.2	13.6

*Bend Setting not recommended for Rotary Drilling

RVDF-70 : 7/8 Lobe 8.5 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	416 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R	

Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	1,910	2,130 psi
Max Torque	18,710	20,790 lbf-ft
Stall Torque	28,060	31,180 lbf-ft
Rotation	0.260	0.260 rev/gal
Flow Range	400-750	400-750 gpm
Speed Range	104-195	104-195 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
0.39	-	-	-	2.0	2.1	2.5
0.78	2.5	2.1	-	3.9	4.0	4.5
1.15	4.6	4.1	1.9	5.7	5.8	6.3
1.50	6.5	6.0	3.8	7.5	7.6	8.0
1.83	8.3	7.8	5.6	9.1	9.2	9.6
2.12	9.9	9.4	7.2	10.5	10.6	11.1
2.38*	11.3	10.8	8.6	11.8	11.9	12.4
2.60*	12.5	12.0	9.8	12.9	13.0	13.4
2.77*	13.5	13.0	10.8	13.7	13.8	14.3
2.90*	14.2	13.7	11.5	14.4	14.5	14.9
2.97*	14.6	14.1	11.9	14.7	14.8	15.3
3.00*	14.7	14.2	12.0	14.9	15.0	15.4

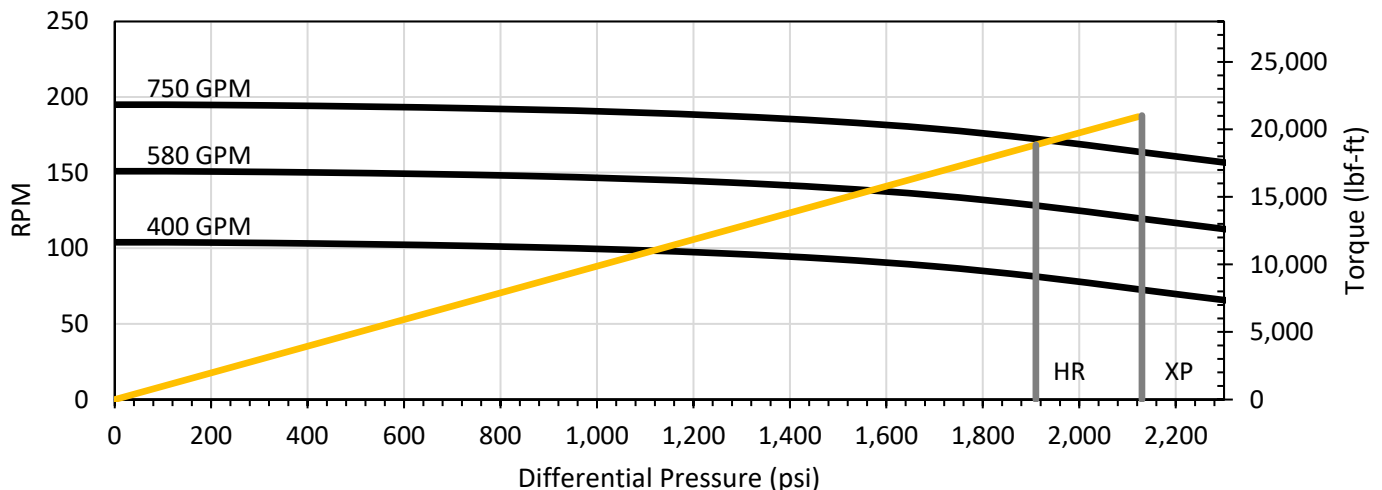
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
0.75	1.7	1.1	-	4.0	4.1	4.5
1.00	3.1	2.5	-	5.3	5.4	5.8
1.25	4.5	3.9	-	6.6	6.7	7.1
1.50	5.9	5.2	2.3	7.9	8.0	8.4
1.63	6.6	5.9	3.0	8.5	8.6	9.1
1.75	7.2	6.6	3.7	9.2	9.3	9.7
1.88	8.0	7.3	4.4	9.8	9.9	10.4
2.00	8.6	8.0	5.1	10.5	10.6	11.0
2.25*	10.0	9.3	6.4	11.8	11.9	12.3
2.38*	10.7	10.1	7.2	12.4	12.5	13.0
2.50*	11.4	10.7	7.8	13.1	13.2	13.6

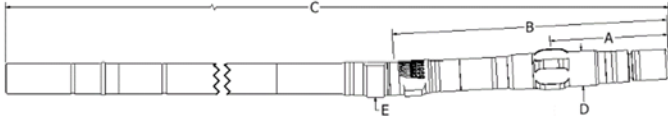
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

RVDF-70 : 6/7 Lobe 10.7 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	68.4 in
Bit to Bend, Fixed	B	49 in
Bit to Top Sub	C	426 in
Body OD, Slick	D	7.25 in
Body OD, Stabilizer	D	7.25 in
Pad Radius, ABH	E	3.75 in
Pad Radius, Fixed	E	3.75 in
Bottom Connection	4-1/2 REG Box 4-1/2 IF Pin	
Top Connection	4-1/2 IF Box 4-1/2 XH Box	
Top Sub Float Bore	4R & 5R	

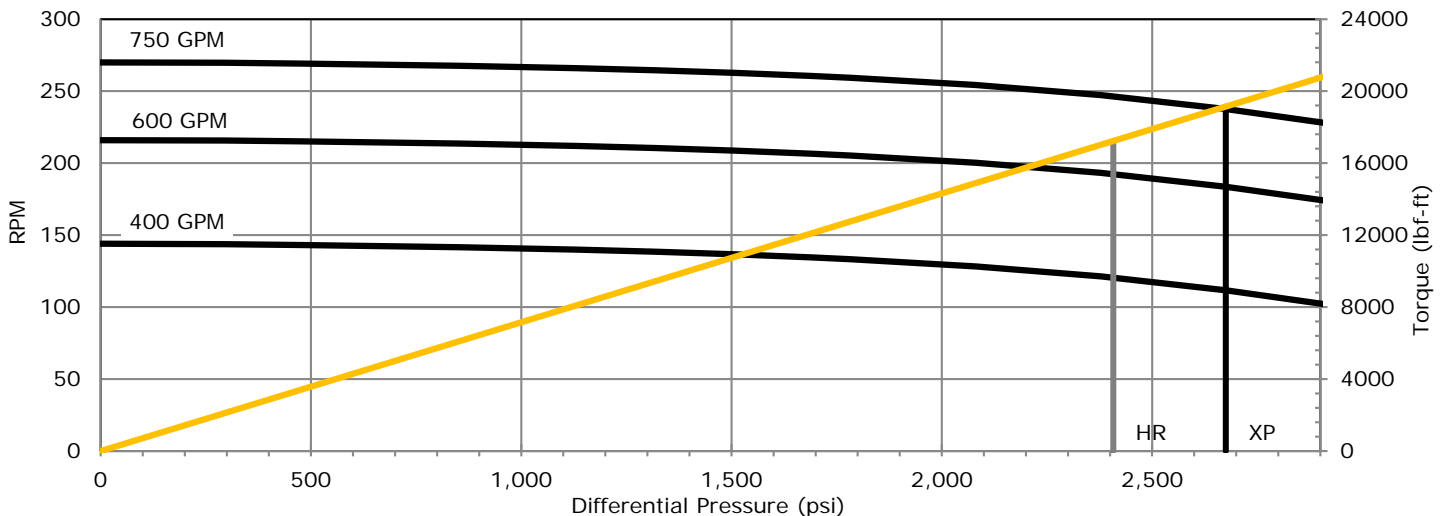
Recommended Operating Limits

Max WOB	160,000 lbf
Max Overpull, Backream	231,000 lbf
Max Overpull, Re-Run	319,000 lbf
Max Overpull, POOH	875,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	2,410	2,650 psi
Max Torque	17,230	18,950 lbf-ft
Stall Torque	25,840	28,420 lbf-ft
Rotation	0.360	0.360 rev/gal
Flow Range	400-750	400-750 gpm
Speed Range	144-270	144-270 rpm

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
Deg						
0.39	-	-	-	2.0	2.1	2.5
0.78	2.5	2.1	-	3.9	4.0	4.5
1.15	4.6	4.1	1.9	5.7	5.8	6.3
1.50	6.5	6.0	3.8	7.5	7.6	8.0
1.83	8.3	7.8	5.6	9.1	9.2	9.6
2.12	9.9	9.4	7.2	10.5	10.6	11.1
2.38*	11.3	10.8	8.6	11.8	11.9	12.4
2.60*	12.5	12.0	9.8	12.9	13.0	13.4
2.77*	13.5	13.0	10.8	13.7	13.8	14.3
2.90*	14.2	13.7	11.5	14.4	14.5	14.9
2.97*	14.6	14.1	11.9	14.7	14.8	15.3
3.00*	14.7	14.2	12.0	14.9	15.0	15.4

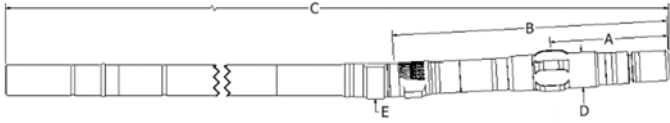
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	8 1/2	8 3/4	9 7/8	8 1/2	8 3/4	9 7/8
Deg						
0.75	1.7	1.1	-	4.0	4.1	4.5
1.00	3.1	2.5	-	5.3	5.4	5.8
1.25	4.5	3.9	-	6.6	6.7	7.1
1.50	5.9	5.2	2.3	7.9	8.0	8.4
1.63	6.6	5.9	3.0	8.5	8.6	9.1
1.75	7.2	6.6	3.7	9.2	9.3	9.7
1.88	8.0	7.3	4.4	9.8	9.9	10.4
2.00	8.6	8.0	5.1	10.5	10.6	11.0
2.25*	10.0	9.3	6.4	11.8	11.9	12.3
2.38*	10.7	10.1	7.2	12.4	12.5	13.0
2.50*	11.4	10.7	7.8	13.1	13.2	13.6

*Bend Setting not recommended for Rotary Drilling

RVDF-96: 5/6 Lobe 4.0 Stage



Dimensions

Bit to Stabilizer Center	A	45 in
Bit to Bend, ABH	B	75 in
Bit to Top Sub	C	411 in
Body OD, Slick	D	9.63 in
Body OD, Stabilizer	D	11.0 in
Pad Radius, ABH	E	5.07 in
Bottom Connection	6-5/8 REG Box 6-5/8 REG Pin 7-5/8 REG Box	
Top Connection	6-5/8 REG Box 7/58 REG Box	
Top Sub Float Bore	5F-6R	

Recommended Operating Limits

Max WOB	261,000 lbf
Max Overpull, Backream	377,000 lbf
Max Overpull, Re-Run	721,000 lbf
Max Overpull, POOH	1,465,000 lbf

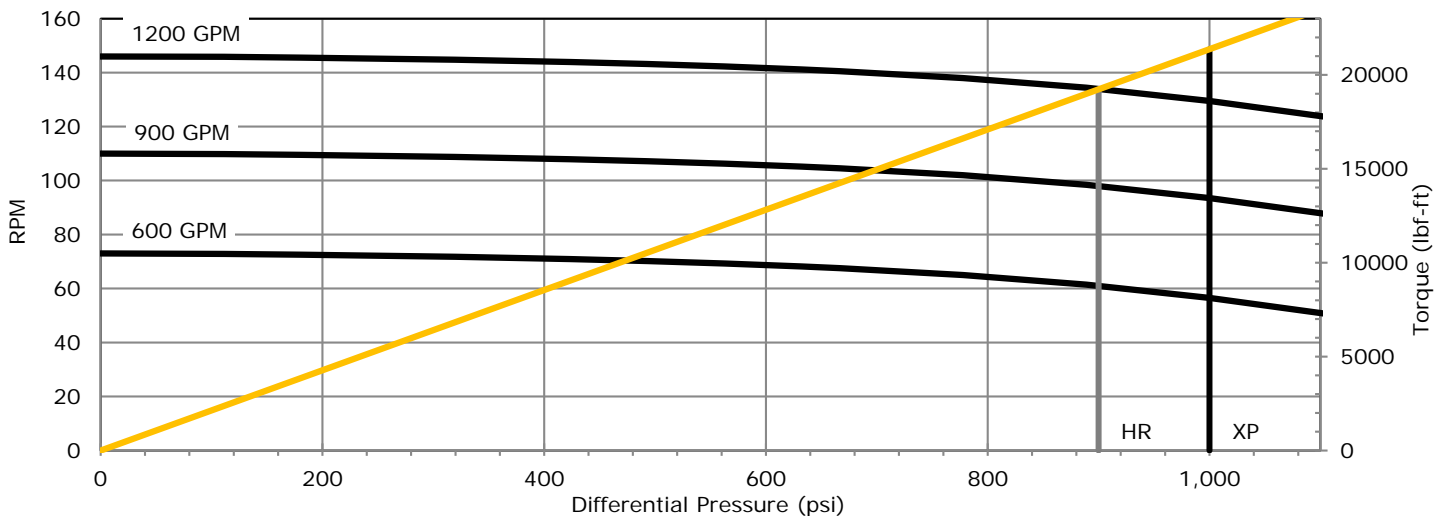
Performance Details	HR	XP
Max Diff Pressure	900	990 psi
Max Torque	19,240	21,160 lbf-ft
Stall Torque	28,850	31,740 lbf-ft
Rotation	0.122	0.122 rev/gal
Flow Range	600-1,200	600-1,200 gpm
Speed Range	73-150	73-150 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	12 1/4	14 3/4	17 1/2	12 1/4	14 3/4	17 1/2
0.39	-	-	-	2.8	3.9	5.2
0.78	-	-	-	4.9	6.0	7.2
1.15	3.0	-	-	6.8	7.9	9.1
1.50	5.0	-	-	8.6	9.7	10.9
1.83	6.9	2.5	-	10.3	11.4	12.6
2.12	8.5	4.2	-	11.8	12.9	14.1
2.38*	10.0	5.6	-	13.2	14.3	15.5
2.60*	11.2	6.9	2.1	14.3	15.4	16.6
2.77*	12.1	7.8	3.1	15.2	16.3	17.5
2.90*	12.9	8.5	3.8	15.9	17.0	18.2
2.97*	13.3	8.9	4.2	16.2	17.3	18.5
3.00*	13.4	9.1	4.4	16.4	17.5	18.7

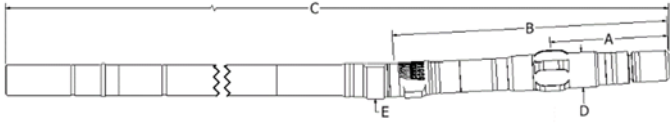
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

RVDF-96: 7/8 Lobe 3.9 Stage



Dimensions

Bit to Stabilizer Center	A	45 in
Bit to Bend, ABH	B	75 in
Bit to Top Sub	C	483 in
Body OD, Slick	D	9.63 in
Body OD, Stabilizer	D	11.0 in
Pad Radius, ABH	E	5.07 in
Bottom Connection	6-5/8 REG Box 6-5/8 REG Pin 7-5/8 REG Box	
Top Connection	6-5/8 REG Box 7/58 REG Box	
Top Sub Float Bore	5F-6R	

Recommended Operating Limits

Max WOB	261,000 lbf
Max Overpull, Backream	377,000 lbf
Max Overpull, Re-Run	721,000 lbf
Max Overpull, POOH	1,465,000 lbf

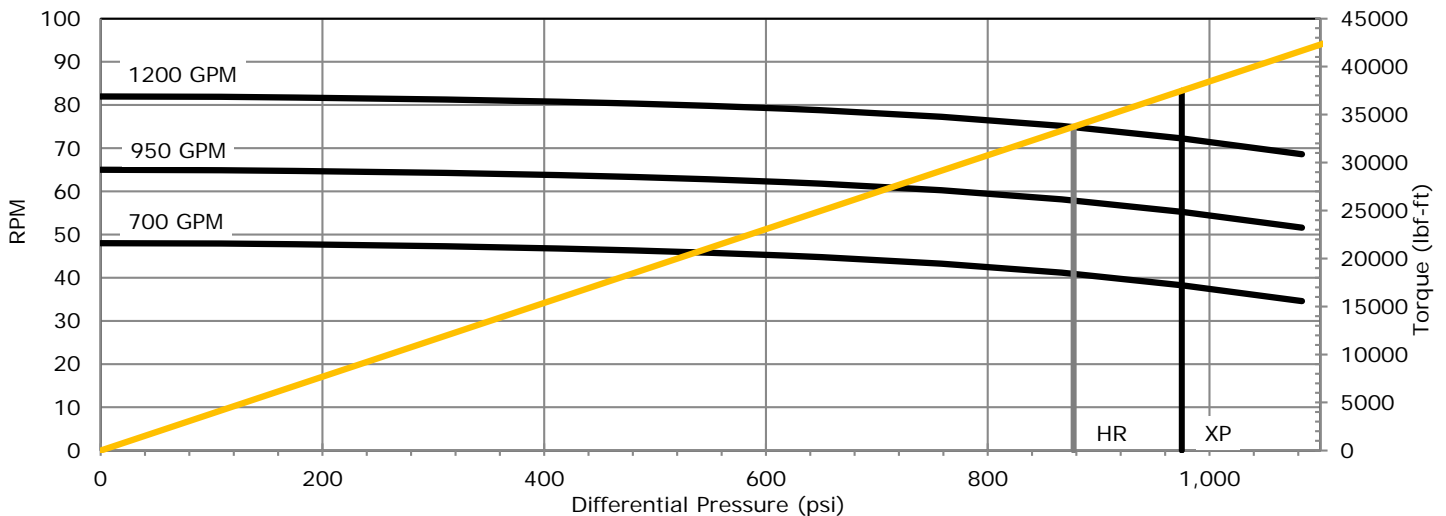
Performance Details	HR	XP
Max Diff Pressure	880	970 psi
Max Torque	33,750	37,130 lbf-ft
Stall Torque	50,630	55,700 lbf-ft
Rotation	0.068	0.068 rev/gal
Flow Range	700-1,200	700-1,200 gpm
Speed Range	47-82	47-82 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	12 1/4	14 3/4	17 1/2	12 1/4	14 3/4	17 1/2
0.39	-	-	-	2.3	3.1	4.0
0.78	-	-	-	4.0	4.8	5.7
1.15	2.6	-	-	5.7	6.5	7.4
1.50	4.2	-	-	7.3	8.1	9.0
1.83	5.8	2.1	-	8.8	9.6	10.4
2.12	7.2	3.5	-	10.1	10.9	11.7
2.38*	8.5	4.8	-	11.2	12.0	12.9
2.60*	9.5	5.8	1.8	12.2	13.0	13.9
2.77*	10.4	6.7	2.6	13.0	13.8	14.7
2.90*	11.0	7.3	3.2	13.6	14.4	15.2
2.97*	11.3	7.6	3.6	13.9	14.7	15.6
3.00*	11.5	7.8	3.7	14.0	14.8	15.7

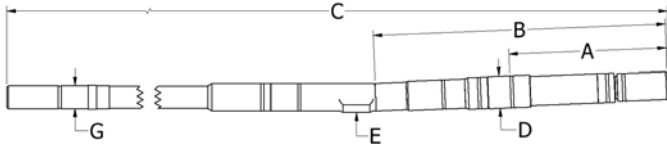
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

RVDF-96 Combo: 7/8 Lobe 4.0 Stage



Dimensions

Bit to Stabilizer Center	A	45 in
Bit to Bend, ABH	B	75 in
Bit to Top Sub	C	378 in
Body OD, Slick	D	9.63 in
Body OD, Stabilizer	D	11.0 in
Pad Radius, ABH	E	5.07 in
Power Section OD	G	7.75 in
Bottom Connection	6-5/8 REG Box 6-5/8 REG Pin 7-5/8 REG Box	
Top Connection	6-5/8 REG Box	
Top Sub Float Bore	5F-6R	

Recommended Operating Limits

Max WOB	261,000 lbf
Max Overpull, Backream	377,000 lbf
Max Overpull, Re-Run	721,000 lbf
Max Overpull, POOH	1,232,000 lbf

Performance Details

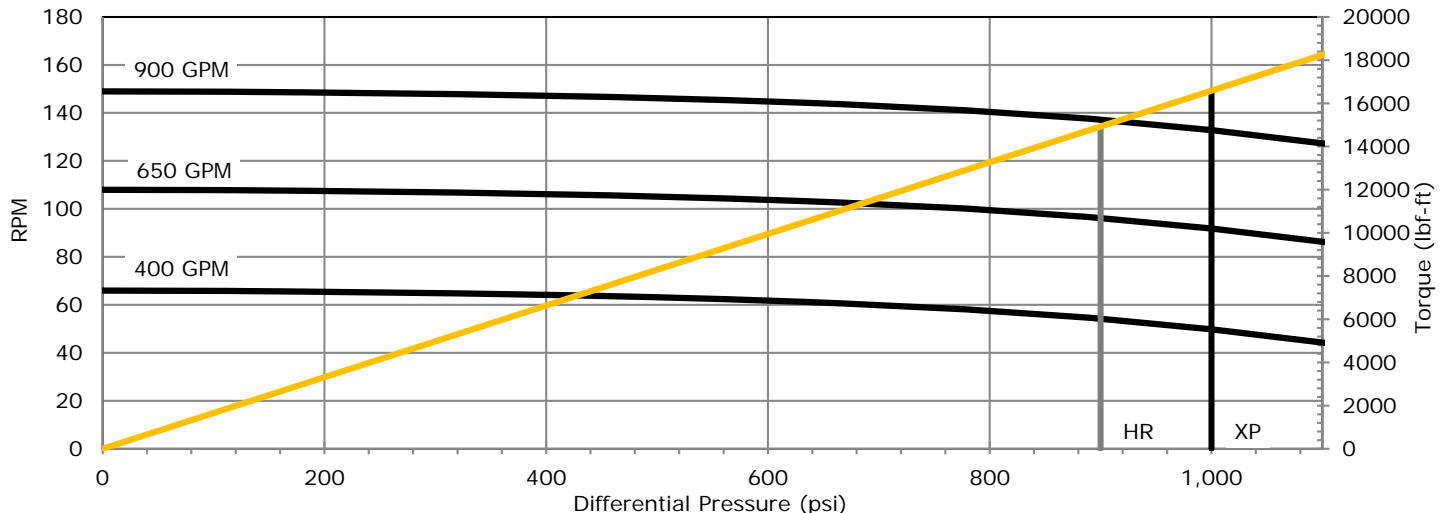
	HR	XP
Max Diff Pressure	900	990 psi
Max Torque	14,930	16,420 lbf-ft
Stall Torque	22,400	24,640 lbf-ft
Rotation	0.166	0.166 rev/gal
Flow Range	400-900	400-900 gpm
Speed Range	66-150	66-150 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	12 1/4	14 3/4	17 1/2	12 1/4	14 3/4	17 1/2
0.39	-	-	-	4.2	5.5	7.0
0.78	2.2	-	-	6.4	7.7	9.1
1.15	4.4	-	-	8.4	9.7	11.2
1.50	6.5	1.9	-	10.4	11.7	13.2
1.83	8.6	3.9	-	12.2	13.5	15.0
2.12	10.3	5.6	-	13.8	15.1	16.6
2.38*	11.9	7.2	2.1	15.3	16.6	18.1
2.60*	13.2	8.6	3.4	16.5	17.8	19.3
2.77*	14.3	9.6	4.4	17.4	18.8	20.2
2.90*	15.1	10.4	5.2	18.2	19.5	20.9
2.97*	15.5	10.8	5.7	18.6	19.9	21.3
3.00*	15.7	11.0	5.8	18.7	20.0	21.5

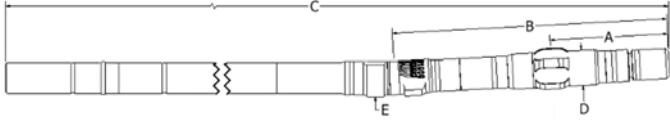
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

RVDF-96: 7/8 Lobe 4.8 Stage



Dimensions

Bit to Stabilizer Center	A	45 in
Bit to Bend, ABH	B	75 in
Bit to Top Sub	C	429 in
Body OD, Slick	D	9.63 in
Body OD, Stabilizer	D	11.0 in
Pad Radius, ABH	E	5.07 in
Bottom Connection	6-5/8 REG Box 6-5/8 REG Pin 7-5/8 REG Box	
Top Connection	6-5/8 REG Box 7/58 REG Box	
Top Sub Float Bore	5F-6R	

Recommended Operating Limits

Max WOB	261,000 lbf
Max Overpull, Backream	377,000 lbf
Max Overpull, Re-Run	721,000 lbf
Max Overpull, POOH	1,465,000 lbf

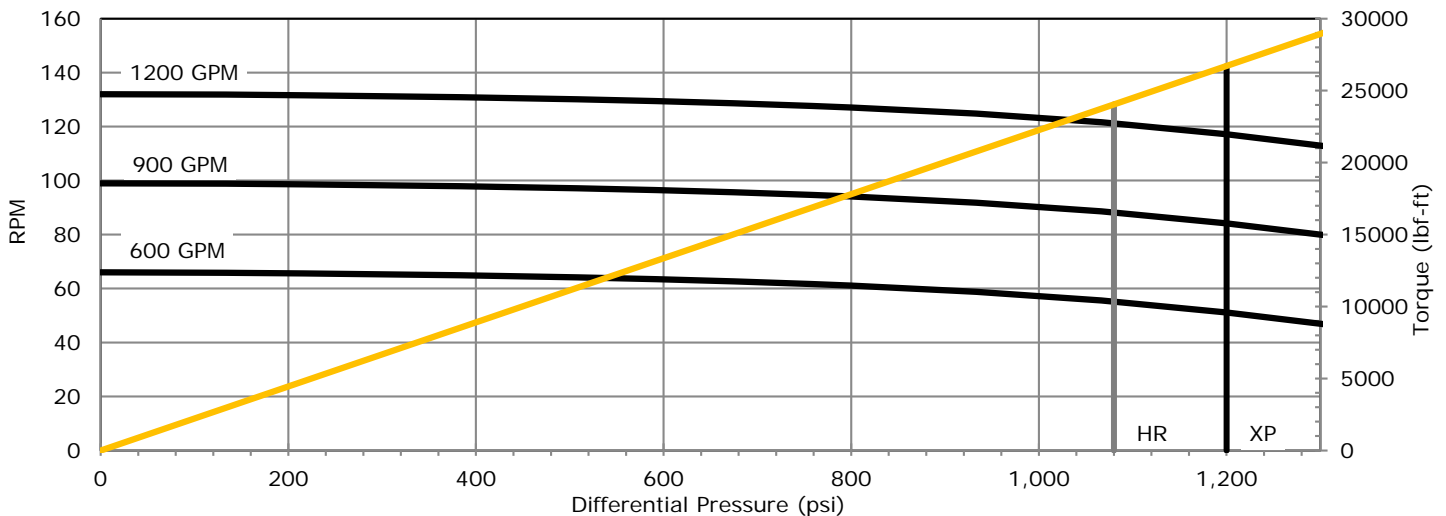
Performance Details	HR	XP
Max Diff Pressure	1080	1190 psi
Max Torque	24,050	26,460 lbf-ft
Stall Torque	36,070	39,680 lbf-ft
Rotation	0.110	0.110 rev/gal
Flow Range	600-1,200	600-1,200 gpm
Speed Range	66-132	66-132 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

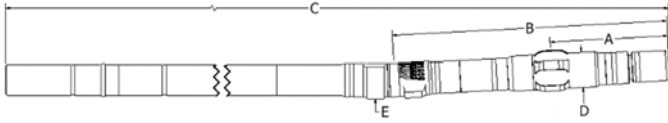
Bend Setting	Slick Hole Size			Stabilized Hole Size		
	12 1/4	14 3/4	17 1/2	12 1/4	14 3/4	17 1/2
Deg						
0.39	-	-	-	2.7	3.7	4.8
0.78	-	-	-	4.6	5.6	6.7
1.15	2.9	-	-	6.5	7.5	8.6
1.50	4.8	-	-	8.2	9.2	10.3
1.83	6.6	2.4	-	9.9	10.9	12.0
2.12	8.1	4.0	-	11.3	12.3	13.4
2.38*	9.5	5.4	-	12.6	13.6	14.7
2.60*	10.7	6.6	2.0	13.7	14.7	15.8
2.77*	11.6	7.5	2.9	14.6	15.6	16.7
2.90*	12.3	8.2	3.6	15.2	16.2	17.3
2.97*	12.7	8.6	4.0	15.5	16.6	17.7
3.00*	12.9	8.7	4.2	15.7	16.7	17.8

*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

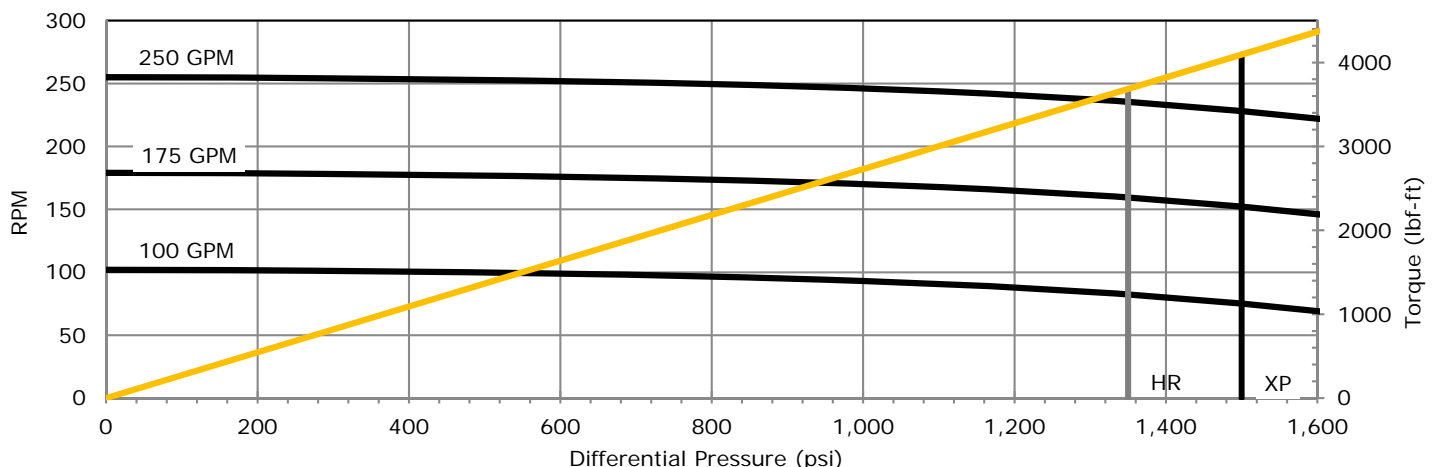
RVDF-50 : 4/5 Lobe 6.0 Stage

Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	52.8 in
Bit to Bend, Fixed	B	42.3 in
Bit to Top Sub	C	300 in
Body OD, Slick	D	5.06 in
Body OD, Stabilizer	D	5.06 in
Pad Radius, ABH	E	2.66 in
Pad Radius, Fixed	E	2.67 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF Pin 3-1/2 Athens Pin	
Top Connection	3-1/2 REG Box 3-1/2 IF Box 3-1/2 XH Box	
Top Sub Float Bore	2F-3R, 3F, 3-1/2 IF	

Recommended Operating Limits

Max WOB	60,000 lbf
Max Overpull, Backream	87,000 lbf
Max Overpull, Re-Run	125,000 lbf
Max Overpull, POOH	421,000 lbf

Performance Details	HR	XP
Max Diff Pressure	1,350	1,490 psi
Max Torque	3,690	4,060 lbf-ft
Stall Torque	5,530	6,080 lbf-ft
Rotation	1.020	1.020 rev/gal
Flow Range	100-250	100-250 gpm
Speed Range	102-260	102-260 rpm

Theoretical Performance Curve


Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.39	-	-	-	2.5	2.7	3.1
0.78	4.2	3.2	1.2	5.3	5.5	5.9
1.15	7.2	6.2	4.3	7.9	8.2	8.6
1.50	10.1	9.1	7.2	10.4	10.7	11.1
1.83	12.8	11.8	9.9	12.8	13.0	13.5
2.12	15.2	14.2	12.3	15.2	15.1	15.6
2.38*	17.3	16.4	14.4	17.3	17.0	17.4
2.60*	19.1	18.2	16.2	19.1	18.6	19.0
2.77*	20.5	19.6	17.6	20.5	19.8	20.2
2.90*	21.6	20.6	18.7	21.6	20.7	21.1
2.97*	22.2	21.2	19.3	22.2	21.2	21.6
3.00*	22.4	21.4	19.5	22.4	21.4	21.9

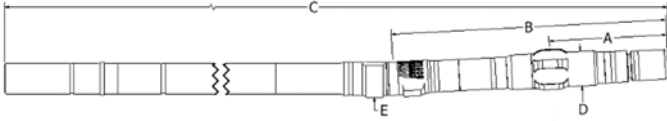
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.75	3.5	2.3	-	5.3	5.5	6.0
1.15	6.8	5.6	3.3	8.3	8.5	9.0
1.50	9.6	8.5	6.1	10.9	11.2	11.6
1.75	11.7	10.5	8.2	12.8	13.0	13.5
1.83	12.4	11.2	8.8	13.4	13.6	14.1
2.00	13.8	12.6	10.2	14.7	14.9	15.4
2.12	14.7	13.6	11.2	15.6	15.8	16.2
2.25*	15.8	14.6	12.3	16.6	16.8	17.2
2.38*	16.9	15.7	13.4	17.5	17.8	18.2
2.50*	17.9	16.7	14.4	18.4	18.7	19.1

*Bend Setting not recommended for Rotary Drilling

RVDF-50 : 5/6 Lobe 8.3 Stage



Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	52.8 in
Bit to Bend, Fixed	B	42.3 in
Bit to Top Sub	C	356 in
Body OD, Slick	D	5.06 in
Body OD, Stabilizer	D	5.06 in
Pad Radius, ABH	E	2.66 in
Pad Radius, Fixed	E	2.67 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF Pin 3-1/2 Athens Pin	
Top Connection	3-1/2 REG Box 3-1/2 IF Box 3-1/2 XH Box	
Top Sub Float Bore	2F-3R, 3F, 3-1/2 IF	

Recommended Operating Limits

Max WOB	60,000 lbf
Max Overpull, Backream	87,000 lbf
Max Overpull, Re-Run	125,000 lbf
Max Overpull, POOH	421,000 lbf

Performance Details	HR	XP
Max Diff Pressure	1,870	2,030 psi
Max Torque	4,810	5,290 lbf-ft
Stall Torque	7,220	7,940 lbf-ft
Rotation	1.000	1.000 rev/gal
Flow Range	100-300	100-300 gpm
Speed Range	100-300	100-300 rpm

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.39	-	-	-	2.0	2.2	2.5
0.78	3.4	2.6	1.0	4.4	4.6	4.9
1.15	6.0	5.2	3.5	6.7	6.9	7.2
1.50	8.4	7.6	6.0	8.9	9.0	9.4
1.83	10.7	9.9	8.2	10.9	11.1	11.4
2.12	12.7	11.9	10.3	12.7	12.9	13.2
2.38*	14.5	13.7	12.0	14.5	14.5	14.8
2.60*	16.0	15.2	13.6	16.0	15.8	16.1
2.77*	17.2	16.4	14.7	17.2	16.9	17.2
2.90*	18.1	17.3	15.6	18.1	17.7	18.0
2.97*	18.6	17.7	16.1	18.6	18.1	18.4
3.00*	18.8	18.0	16.3	18.8	18.3	18.6

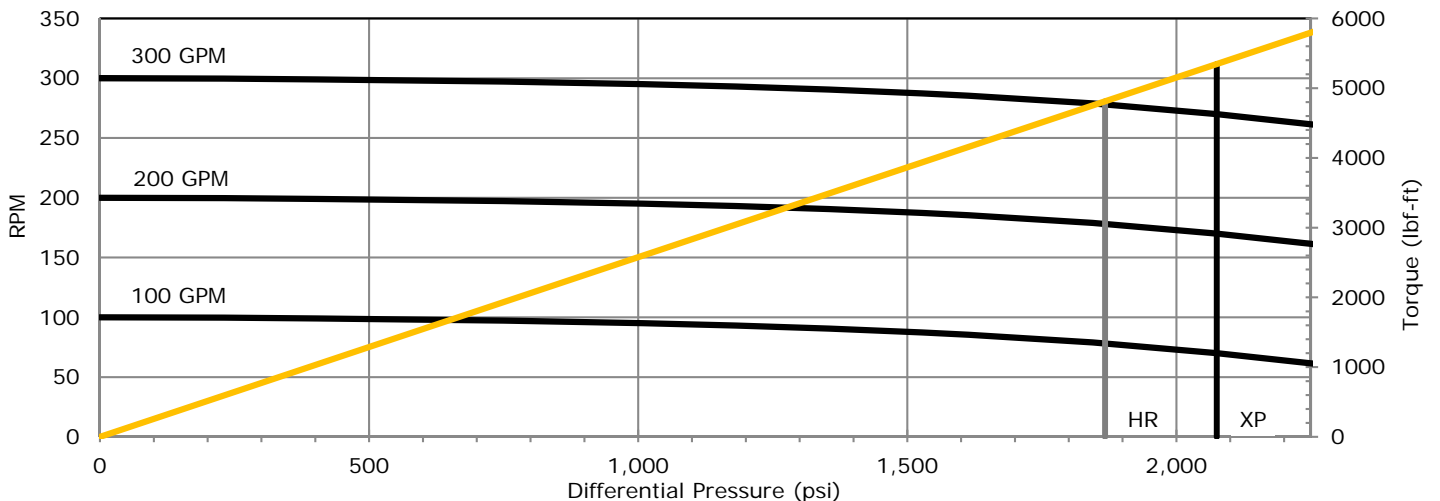
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

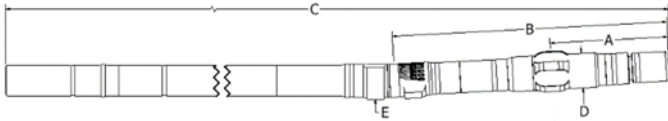
Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.75	2.9	1.9	-	4.4	4.6	4.9
1.15	5.6	4.6	2.7	7.0	7.1	7.5
1.50	8.0	7.1	5.1	9.2	9.4	9.7
1.75	9.8	8.8	6.8	10.8	11.0	11.3
1.83	10.3	9.3	7.4	11.3	11.5	11.8
2.00	11.5	10.5	8.6	12.4	12.6	12.9
2.12	12.3	11.3	9.4	13.2	13.4	13.7
2.25*	13.2	12.2	10.3	14.0	14.2	14.5
2.38*	14.1	13.1	11.2	14.9	15.0	15.3
2.50*	15.0	14.0	12.0	15.6	15.8	16.1

*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

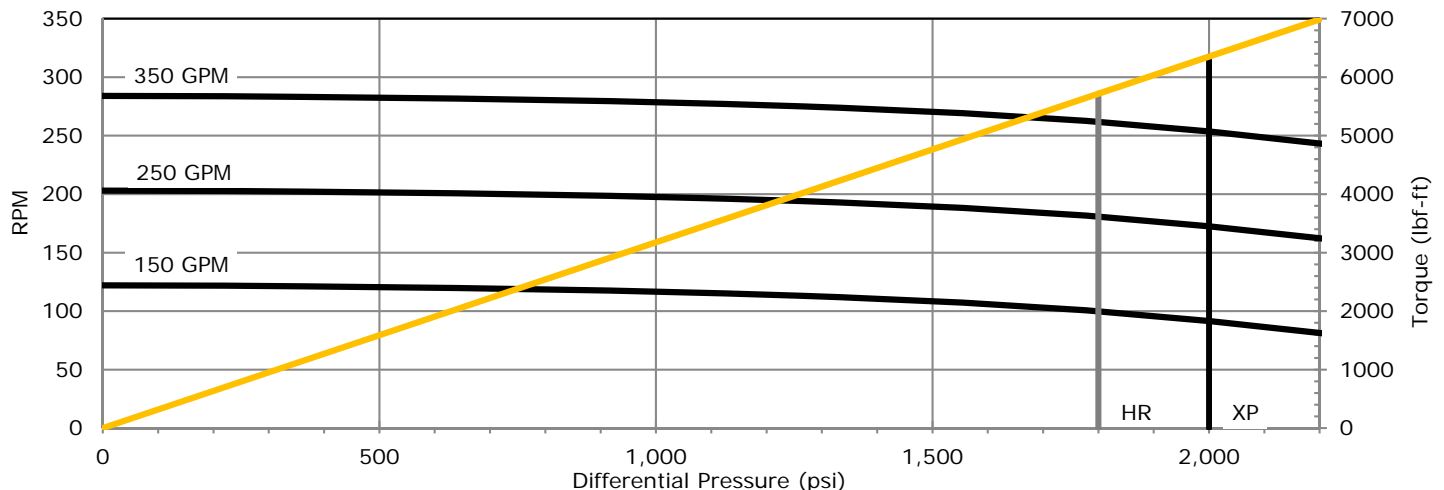
RVDF-50 : 6/7 Lobe 8.0 Stage

Dimensions

Bit to Stabilizer Center	A	30 in
Bit to Bend, ABH	B	52.8 in
Bit to Bend, Fixed	B	42.3 in
Bit to Top Sub	C	359 in
Body OD, Slick	D	5.06 in
Body OD, Stabilizer	D	5.06 in
Pad Radius, ABH	E	2.66 in
Pad Radius, Fixed	E	2.67 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF Pin 3-1/2 Athens Pin	
Top Connection	3-1/2 REG Box 3-1/2 IF Box 3-1/2 XH Box	
Top Sub Float Bore	2F-3R, 3F, 3-1/2 IF	

Recommended Operating Limits

Max WOB	60,000 lbf
Max Overpull, Backream	87,000 lbf
Max Overpull, Re-Run	125,000 lbf
Max Overpull, POOH	421,000 lbf

Performance Details	HR	XP
Max Diff Pressure	1,800	2,000 psi
Max Torque	5,720	6,350 lbf-ft
Stall Torque	8,580	9,530 lbf-ft
Rotation	0.810	0.810 rev/gal
Flow Range	150-350	150-350 gpm
Speed Range	122-284	122-284 rpm

Theoretical Performance Curve


Performance curves based on testing at 70°F. Actual field performance may vary with field operation conditions.

Predicted Build Rates (Adj.) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.39	-	-	-	2.0	2.2	2.5
0.78	3.4	2.6	1.0	4.4	4.5	4.9
1.15	5.9	5.1	3.5	6.7	6.8	7.1
1.50	8.3	7.5	5.9	8.8	9.0	9.3
1.83	10.6	9.8	8.2	10.8	11.0	11.3
2.12	12.6	11.8	10.2	12.6	12.8	13.1
2.38*	14.3	13.5	11.9	14.3	14.3	14.6
2.60*	15.8	15.0	13.4	15.8	15.7	16.0
2.77*	17.0	16.2	14.6	17.0	16.7	17.0
2.90*	17.9	17.1	15.5	17.9	17.5	17.8
2.97*	18.4	17.6	16.0	18.4	18.0	18.3
3.00*	18.6	17.8	16.2	18.6	18.1	18.4

*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	Deg	6	6 1/4	6 3/4	6	6 1/4
0.75	2.8	1.9	-	4.4	4.5	4.8
1.15	5.6	4.6	2.6	6.9	7.1	7.4
1.50	8.0	7.0	5.0	9.1	9.3	9.6
1.75	9.7	8.7	6.8	10.7	10.9	11.2
1.83	10.2	9.3	7.3	11.2	11.4	11.7
2.00	11.4	10.4	8.5	12.3	12.5	12.8
2.12	12.2	11.2	9.3	13.1	13.2	13.5
2.25*	13.1	12.1	10.2	13.9	14.1	14.4
2.38*	14.0	13.0	11.1	14.7	14.9	15.2
2.50*	14.8	13.8	11.9	15.5	15.6	15.9

*Bend Setting not recommended for Rotary Drilling