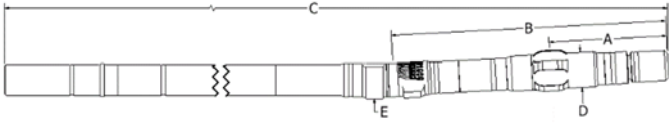


RVTF-47 : 5/6 Lobe 8.3 Stage



Dimensions

Bit to Stabilizer Center	A	16 in
Bit to Bend, ABH	B	57.5 in
Bit to Bend, Fixed	B	43.8 in
Bit to Top Sub	C	353 in
Body OD, Slick	D	4.818 in
Body OD, Stabilizer	D	5.50 in
Pad Radius, ABH	E	2.71 in
Pad Radius, Fixed	E	2.55 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF 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	

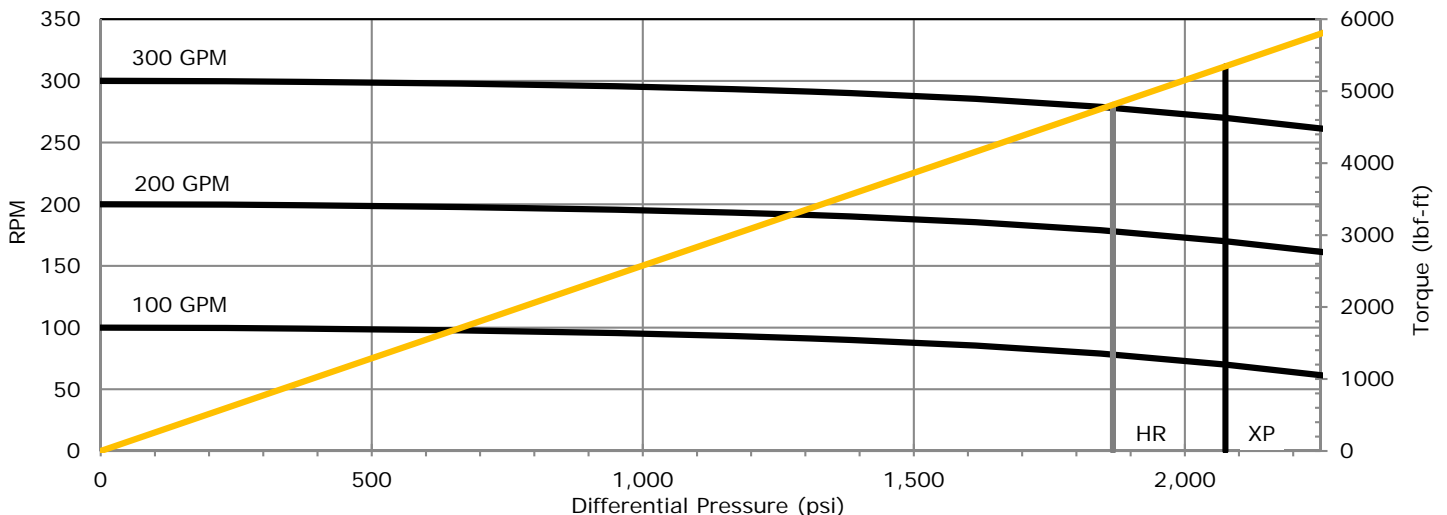
Recommended Operating Limits

Max WOB	43,000 lbf
Max Overpull, Backream	62,000 lbf
Max Overpull, Re-Run	62,000 lbf
Max Overpull, POOH	320,000 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

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		
	6	6 1/4	6 3/4	6	6 1/4	6 3/4
0.39	1.4	-	-	2.0	2.2	2.5
0.78	4.1	3.3	1.8	4.3	4.5	4.8
1.15	6.7	5.9	4.4	6.7	6.7	7.0
1.50	9.1	8.3	6.8	9.1	8.8	9.1
1.83	11.3	10.6	9.1	11.3	10.8	11.1
2.12	13.3	12.6	11.1	13.3	12.6	12.9
2.38*	15.1	14.4	12.9	15.1	14.4	14.4
2.60*	16.6	15.9	14.4	16.6	15.9	15.7
2.77*	17.8	17.1	15.6	17.8	17.1	16.8
2.90*	18.7	18.0	16.5	18.7	18.0	17.5
2.97*	19.2	18.4	16.9	19.2	18.4	18.0
3.00*	19.4	18.6	17.1	19.4	18.6	18.1

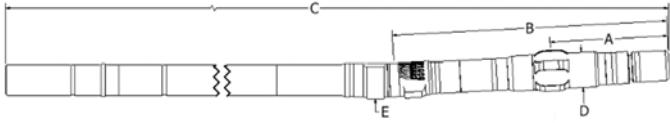
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	6	6 1/4	6 3/4	6	6 1/4	6 3/4
0.75	2.0	1.0	-	6.8	6.8	6.8
1.00	3.7	2.7	-	6.0	6.1	6.4
1.25	5.4	4.4	2.5	7.5	7.7	8.0
1.50	7.1	6.2	4.3	9.1	9.3	9.6
1.63	8.0	7.1	5.1	9.9	10.1	10.4
1.75	8.9	7.9	6.0	10.7	10.9	11.2
1.83	9.4	8.4	6.5	11.2	11.4	11.7
2.00	10.6	9.6	7.7	12.3	12.4	12.7
2.25*	12.3	11.3	9.4	13.9	14.0	14.3
2.38*	13.2	12.2	10.3	14.7	14.8	15.1
2.50*	14.0	13.1	11.1	15.4	15.6	15.9

*Bend Setting not recommended for Rotary Drilling

RVTF-47 : 7/8 Lobe 2.6 Stage



Dimensions

Bit to Stabilizer Center	A	16 in
Bit to Bend, ABH	B	57.5 in
Bit to Bend, Fixed	B	43.8 in
Bit to Top Sub	C	339 in
Body OD, Slick	D	4.818 in
Body OD, Stabilizer	D	5.50 in
Pad Radius, ABH	E	2.71 in
Pad Radius, Fixed	E	2.55 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF 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	43,000 lbf
Max Overpull, Backream	62,000 lbf
Max Overpull, Re-Run	62,000 lbf
Max Overpull, POOH	320,000 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	1.5	-	-	2.1	2.3	2.6
0.78	4.3	3.5	1.9	4.5	4.7	5.0
1.15	6.9	6.2	4.6	6.9	7.0	7.3
1.50	9.5	8.7	7.1	9.5	9.2	9.5
1.83	11.8	11.0	9.5	11.8	11.2	11.5
2.12	13.9	13.1	11.5	13.9	13.1	13.3
2.38*	15.8	15.0	13.4	15.8	15.0	15.0
2.60*	17.3	16.5	15.0	17.3	16.5	16.3
2.77*	18.5	17.8	16.2	18.5	17.8	17.4
2.90*	19.5	18.7	17.1	19.5	18.7	18.2
2.97*	20.0	19.2	17.6	20.0	19.2	18.6
3.00*	20.2	19.4	17.8	20.2	19.4	18.8

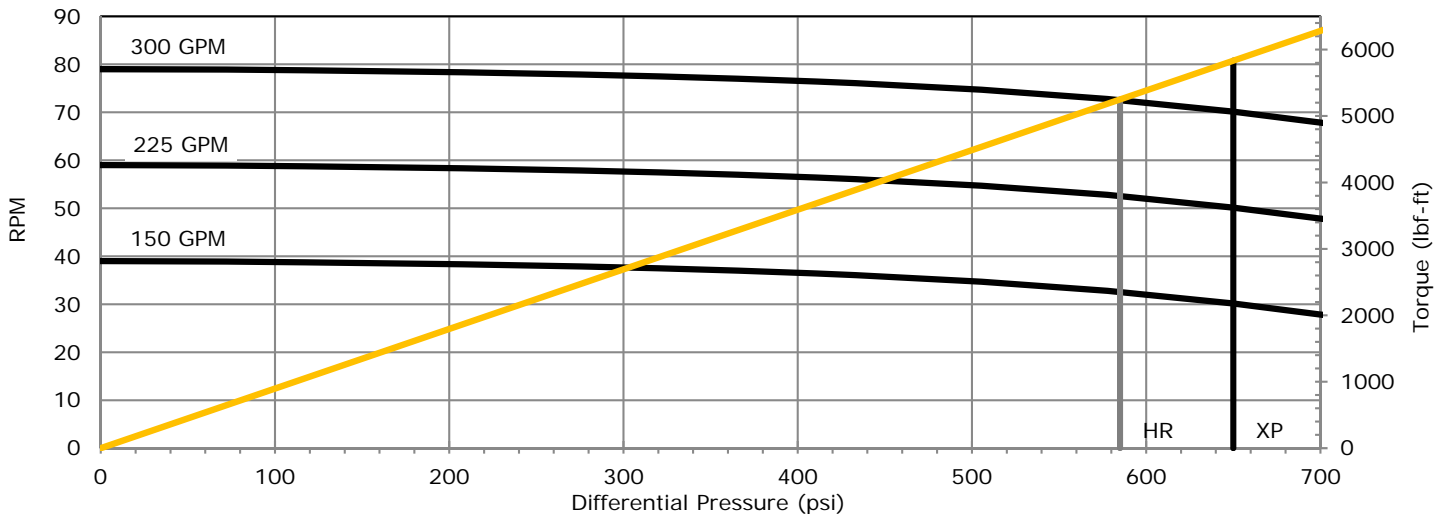
*Bend Setting not recommended for Rotary Drilling

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	2.1	1.1	-	-	-	-
1.00	3.9	2.9	-	6.2	6.4	6.7
1.25	5.7	4.7	2.7	7.8	8.0	8.3
1.50	7.4	6.5	4.5	9.5	9.6	10.0
1.63	8.4	7.4	5.4	10.3	10.5	10.8
1.75	9.2	8.2	6.3	11.1	11.3	11.6
1.83	9.8	8.8	6.8	11.6	11.8	12.1
2.00	11.0	10.0	8.1	12.7	12.9	13.2
2.25*	12.8	11.8	9.8	14.4	14.5	14.9
2.38*	13.8	12.8	10.8	15.2	15.4	15.7
2.50*	14.6	13.6	11.6	16.0	16.2	16.5

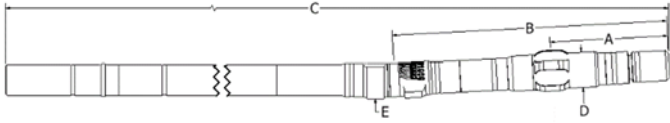
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



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

RVTF-47 : 7/8 Lobe 3.8 Stage



Dimensions

Bit to Stabilizer Center	A	16 in
Bit to Bend, ABH	B	57.5 in
Bit to Bend, Fixed	B	43.8 in
Bit to Top Sub	C	297 in
Body OD, Slick	D	4.818 in
Body OD, Stabilizer	D	5.50 in
Pad Radius, ABH	E	2.71 in
Pad Radius, Fixed	E	2.55 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF 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	43,000 lbf
Max Overpull, Backream	62,000 lbf
Max Overpull, Re-Run	62,000 lbf
Max Overpull, POOH	320,000 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

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

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	6	6 1/4	6 3/4	6	6 1/4	6 3/4
0.39	1.8	-	-	2.5	2.7	3.1
0.78	5.0	4.1	2.3	5.2	5.4	5.8
1.15	8.1	7.2	5.4	8.1	8.0	8.4
1.50	10.9	10.0	8.2	10.9	10.4	10.8
1.83	13.6	12.7	10.9	13.6	12.7	13.1
2.12	16.0	15.1	13.3	16.0	15.1	15.1
2.38*	18.1	17.3	15.5	18.1	17.3	16.9
2.60*	20.0	19.1	17.3	20.0	19.1	18.5
2.77*	21.3	20.4	18.7	21.3	20.4	19.6
2.90*	22.4	21.5	19.7	22.4	21.5	20.5
2.97*	23.0	22.1	20.3	23.0	22.1	21.0
3.00*	23.2	22.3	20.5	23.2	22.3	21.2

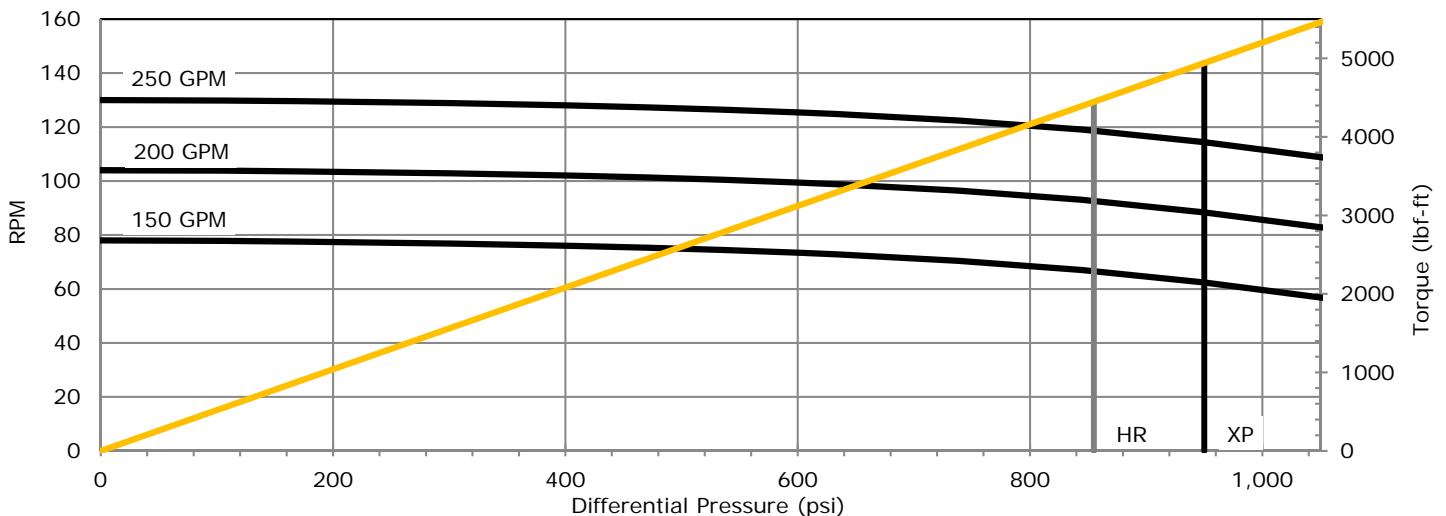
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting Deg	Slick Hole Size			Stabilized Hole Size		
	6	6 1/4	6 3/4	6	6 1/4	6 3/4
0.75	2.4	1.3	1.0	5.3	5.5	6.8
1.00	4.5	3.3	1.1	7.1	7.3	7.8
1.25	6.5	5.4	3.1	9.0	9.2	9.6
1.50	8.6	7.4	5.2	10.8	11.0	11.5
1.63	9.6	8.5	6.2	11.8	12.0	12.4
1.75	10.6	9.5	7.2	12.6	12.9	13.3
1.83	11.3	10.1	7.9	13.2	13.4	13.9
2.00	12.7	11.5	9.3	14.5	14.7	15.1
2.25*	14.7	13.6	11.3	16.3	16.5	17.0
2.38*	15.8	14.7	12.4	17.3	17.5	17.9
2.50*	16.8	15.6	13.4	18.2	18.4	18.8

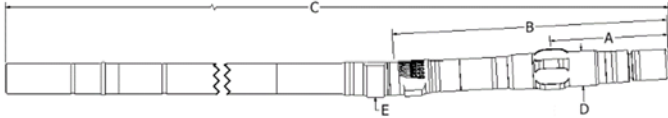
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



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

RVTF-67 : 4/5 Lobe 7.0 Stage



Dimensions

Bit to Stabilizer Center	A	33 in
Bit to Bend, ABH	B	73.6 in
Bit to Bend, Fixed	B	60.4 in
Bit to Top Sub	C	330 in
Body OD, Slick	D	6.87 in
Body OD, Stabilizer	D	6.87 in
Pad Radius, ABH	E	3.63 in
Pad Radius, Fixed	E	3.56 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	

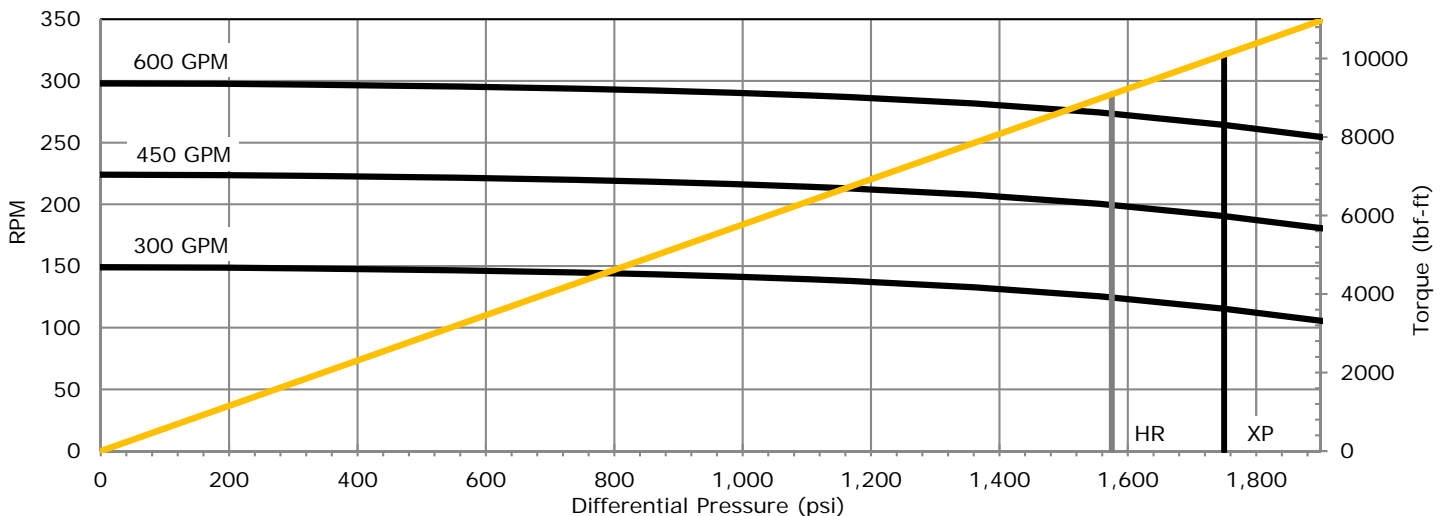
Recommended Operating Limits

Max WOB	127,000 lbf
Max Overpull, Backream	183,000 lbf
Max Overpull, Re-Run	183,000 lbf
Max Overpull, POOH	751,000 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	-	-	-	2.9	3.1	3.9
0.78	2.9	2.3	-	5.3	5.5	6.2
1.15	5.5	4.9	2.3	7.5	7.7	8.5
1.50	8.0	7.4	4.8	9.7	9.8	10.6
1.83	10.3	9.7	7.1	11.7	11.8	12.6
2.12	12.3	11.8	9.1	13.4	13.6	14.4
2.38*	14.2	13.6	10.9	15.0	15.2	15.9
2.60*	15.7	15.1	12.5	16.3	16.5	17.3
2.77*	16.9	16.3	13.7	17.4	17.5	18.3
2.90*	17.8	17.2	14.6	18.2	18.3	19.1
2.97*	18.3	17.7	15.1	18.6	18.7	19.5
3.00*	18.5	17.9	15.3	18.8	18.9	19.7

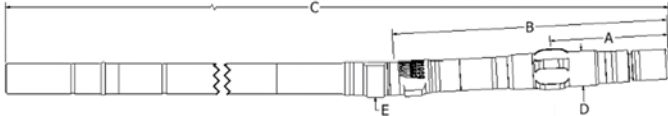
*Bend Setting not recommended for Rotary Drilling

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	1.7	-	-	5.3	5.5	6.3
1.00	3.5	2.8	-	6.9	7.1	7.9
1.25	5.3	4.6	1.4	8.5	8.7	9.5
1.50	7.0	6.3	3.2	10.1	10.3	11.1
1.63	7.9	7.2	4.1	11.0	11.1	11.9
1.75	8.8	8.1	4.9	11.7	11.9	12.7
1.88	9.7	9.0	5.9	12.6	12.7	13.5
2.00	10.5	9.8	6.7	13.3	13.5	14.3
2.25*	12.3	11.6	8.5	14.9	15.1	15.8
2.38*	13.2	12.5	9.4	15.7	15.9	16.7
2.50*	14.0	13.3	10.2	16.5	16.7	17.4

*Bend Setting not recommended for Rotary Drilling

RVTF-67 : 7/8 Lobe 3.5 Stage



Dimensions

Bit to Stabilizer Center	A	33 in
Bit to Bend, ABH	B	73.6 in
Bit to Bend, Fixed	B	60.4 in
Bit to Top Sub	C	380 in
Body OD, Slick	D	6.87 in
Body OD, Stabilizer	D	6.87 in
Pad Radius, ABH	E	3.63 in
Pad Radius, Fixed	E	3.56 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	

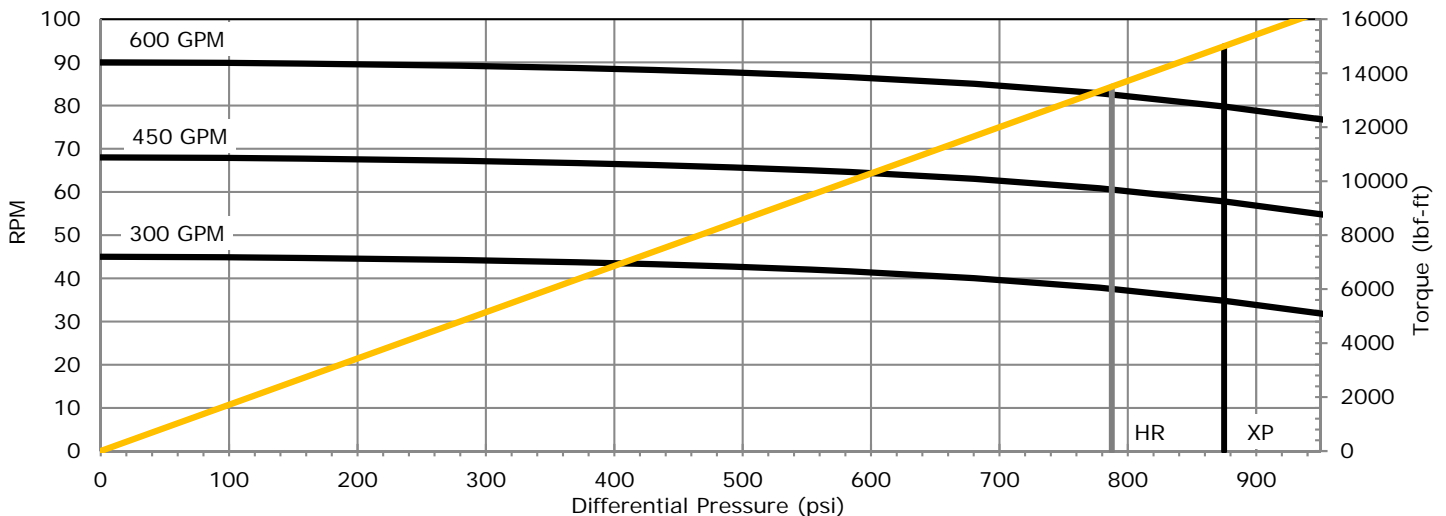
Recommended Operating Limits

Max WOB	127,000 lbf
Max Overpull, Backream	183,000 lbf
Max Overpull, Re-Run	183,000 lbf
Max Overpull, POOH	751,000 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 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	-	-	-	2.5	2.6	3.2
0.78	2.5	2.0	-	4.6	4.7	5.3
1.15	4.8	4.3	2.0	6.6	6.7	7.3
1.50	6.9	6.4	4.1	8.5	8.6	9.2
1.83	8.9	8.4	6.1	10.3	10.4	10.9
2.12	10.7	10.2	7.9	11.8	11.9	12.5
2.38*	12.3	11.8	9.5	13.2	13.4	13.9
2.60*	13.6	13.1	10.8	14.4	14.5	15.1
2.77*	14.7	14.2	11.9	15.3	15.5	16.0
2.90*	15.5	15.0	12.7	16.0	16.2	16.7
2.97*	15.9	15.4	13.1	16.4	16.5	17.1
3.00*	16.1	15.6	13.3	16.6	16.7	17.3

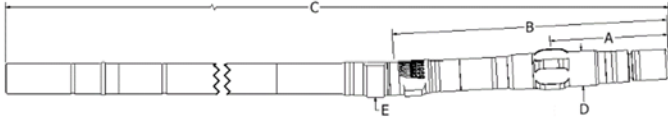
*Bend Setting not recommended for Rotary Drilling

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	1.5	-	-	4.6	4.7	5.3
1.00	3.0	2.4	-	6.0	6.1	6.7
1.25	4.5	3.9	1.2	7.4	7.5	8.1
1.50	6.1	5.5	2.7	8.8	8.9	9.5
1.63	6.9	6.3	3.5	9.6	9.7	10.2
1.75	7.6	7.0	4.3	10.2	10.4	10.9
1.88	8.4	7.8	5.1	11.0	11.1	11.7
2.00	9.1	8.5	5.8	11.6	11.8	12.3
2.25*	10.7	10.1	7.3	13.1	13.2	13.7
2.38*	11.5	10.9	8.1	13.8	13.9	14.5
2.50*	12.2	11.6	8.9	14.5	14.6	15.2

*Bend Setting not recommended for Rotary Drilling

RVTF-67 : 7/8 Lobe 5.0 Stage



Dimensions

Bit to Stabilizer Center	A	33 in
Bit to Bend, ABH	B	73.6 in
Bit to Bend, Fixed	B	60.4 in
Bit to Top Sub	C	315 in
Body OD, Slick	D	6.87 in
Body OD, Stabilizer	D	6.87 in
Pad Radius, ABH	E	3.63 in
Pad Radius, Fixed	E	3.56 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	

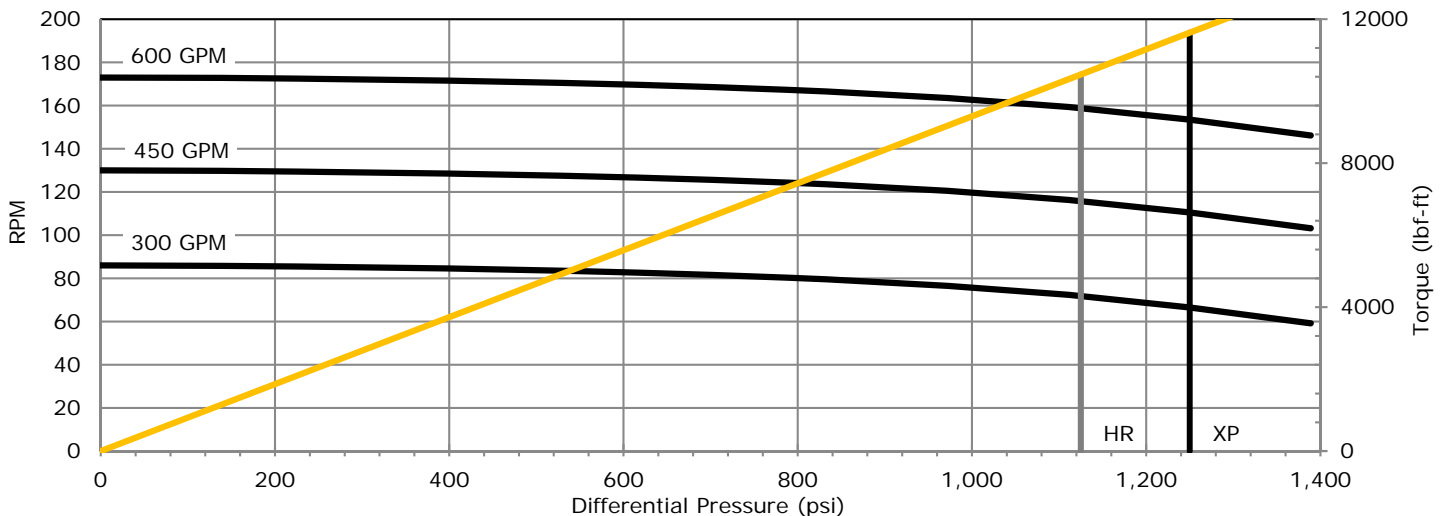
Recommended Operating Limits

Max WOB	127,000 lbf
Max Overpull, Backream	183,000 lbf
Max Overpull, Re-Run	183,000 lbf
Max Overpull, POOH	751,000 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	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	-	-	-	3.1	3.3	4.1
0.78	3.1	2.5	-	5.6	5.7	6.6
1.15	5.8	5.2	2.4	7.9	8.1	8.9
1.50	8.4	7.8	5.0	10.1	10.3	11.1
1.83	10.8	10.2	7.4	12.2	12.4	13.2
2.12	13.0	12.3	9.6	14.0	14.2	15.0
2.38*	14.9	14.3	11.5	15.6	15.8	16.7
2.60*	16.5	15.9	13.1	17.0	17.2	18.1
2.77*	17.7	17.1	14.4	18.1	18.3	19.1
2.90*	18.7	18.1	15.3	18.9	19.1	19.9
2.97*	19.2	18.6	15.8	19.4	19.5	20.4
3.00*	19.4	18.8	16.0	19.5	19.7	20.6

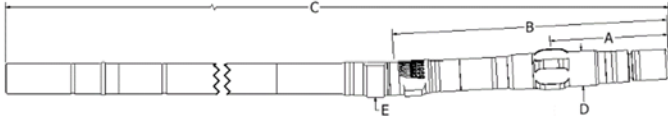
*Bend Setting not recommended for Rotary Drilling

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	1.8	1.1	-	5.6	5.8	6.7
1.00	3.7	3.0	-	7.3	7.5	8.3
1.25	5.5	4.8	1.5	9.0	9.1	10.0
1.50	7.4	6.6	3.4	10.6	10.8	11.7
1.63	8.3	7.6	4.3	11.5	11.7	12.5
1.75	9.2	8.5	5.2	12.3	12.5	13.3
1.88	10.2	9.4	6.2	13.1	13.3	14.2
2.00	11.0	10.3	7.0	13.9	14.1	15.0
2.25*	12.9	12.2	8.9	15.6	15.8	16.6
2.38*	13.8	13.1	9.8	16.5	16.7	17.5
2.50*	14.7	14.0	10.7	17.3	17.5	18.3

*Bend Setting not recommended for Rotary Drilling

RVTF-67 : 7/8 Lobe 5.7 Stage



Dimensions

Bit to Stabilizer Center	A	33 in
Bit to Bend, ABH	B	73.6 in
Bit to Bend, Fixed	B	60.4 in
Bit to Top Sub	C	380 in
Body OD, Slick	D	6.87 in
Body OD, Stabilizer	D	6.87 in
Pad Radius, ABH	E	3.63 in
Pad Radius, Fixed	E	3.56 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	

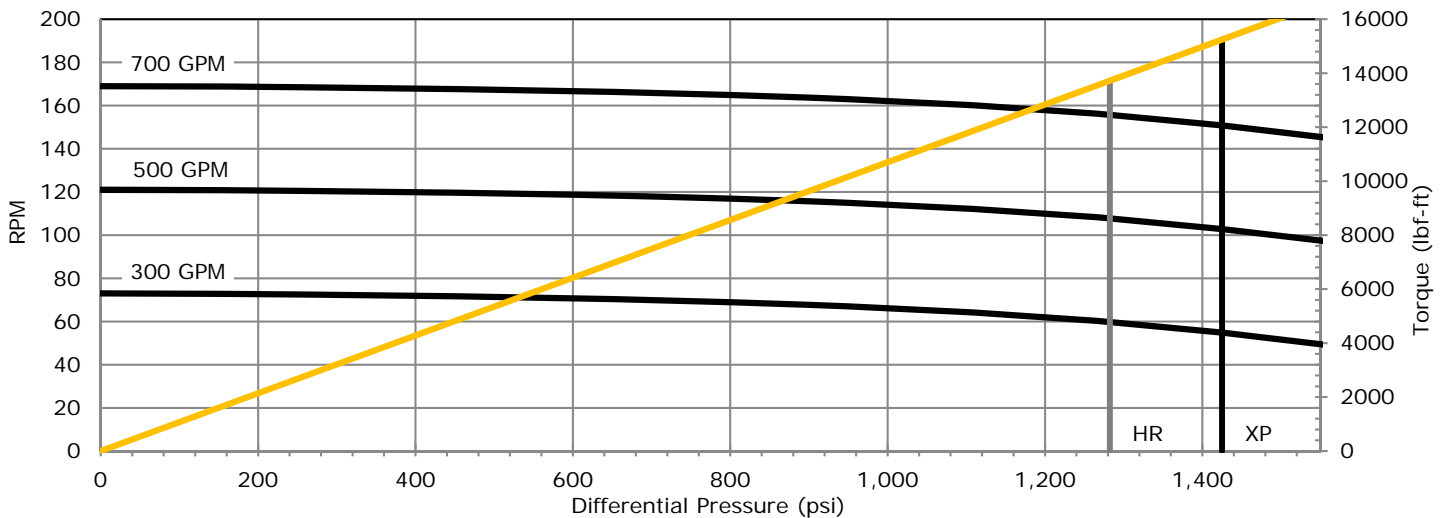
Recommended Operating Limits

Max WOB	127,000 lbf
Max Overpull, Backream	183,000 lbf
Max Overpull, Re-Run	183,000 lbf
Max Overpull, POOH	751,000 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	-	-	-	2.5	2.6	3.2
0.78	2.5	2.0	-	4.6	4.7	5.3
1.15	4.8	4.3	2.0	6.6	6.7	7.3
1.50	6.9	6.4	4.1	8.5	8.6	9.2
1.83	8.9	8.4	6.1	10.3	10.4	10.9
2.12	10.7	10.2	7.9	11.8	11.9	12.5
2.38*	12.3	11.8	9.5	13.2	13.4	13.9
2.60*	13.6	13.1	10.8	14.4	14.5	15.1
2.77*	14.7	14.2	11.9	15.3	15.5	16.0
2.90*	15.5	15.0	12.7	16.0	16.2	16.7
2.97*	15.9	15.4	13.1	16.4	16.5	17.1
3.00*	16.1	15.6	13.3	16.6	16.7	17.3

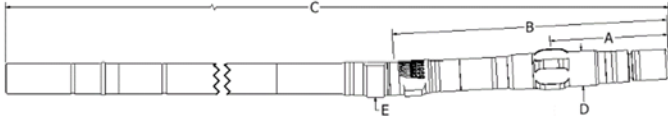
*Bend Setting not recommended for Rotary Drilling

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	1.5	-	-	4.6	4.7	5.3
1.00	3.0	2.4	-	6.0	6.1	6.7
1.25	4.5	3.9	1.2	7.4	7.5	8.1
1.50	6.1	5.5	2.7	8.8	8.9	9.5
1.63	6.9	6.3	3.5	9.6	9.7	10.2
1.75	7.6	7.0	4.3	10.2	10.4	10.9
1.88	8.4	7.8	5.1	11.0	11.1	11.7
2.00	9.1	8.5	5.8	11.6	11.8	12.3
2.25*	10.7	10.1	7.3	13.1	13.2	13.7
2.38*	11.5	10.9	8.1	13.8	13.9	14.5
2.50*	12.2	11.6	8.9	14.5	14.6	15.2

*Bend Setting not recommended for Rotary Drilling

RVTF-67 : 7/8 Lobe 6.8 Stage



Dimensions

Bit to Stabilizer Center	A	33 in
Bit to Bend, ABH	B	73.6 in
Bit to Bend, Fixed	B	60.4 in
Bit to Top Sub	C	353 in
Body OD, Slick	D	6.87 in
Body OD, Stabilizer	D	6.87 in
Pad Radius, ABH	E	3.63 in
Pad Radius, Fixed	E	3.56 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	127,000 lbf
Max Overpull, Backream	183,000 lbf
Max Overpull, Re-Run	183,000 lbf
Max Overpull, POOH	751,000 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	300-600	300-600 gpm
Speed Range	91-182	91-182 rpm

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	2.5	2.0	-	4.8	4.9	5.6
0.78	4.2	3.6	1.1	6.2	6.3	7.0
1.15	5.8	5.3	2.8	7.6	7.8	8.4
1.50	7.5	6.9	4.4	9.1	9.2	9.9
1.83	8.3	7.8	5.3	9.8	10.0	10.6
2.12	9.1	8.6	6.1	10.5	10.7	11.3
2.38*	10.0	9.4	6.9	11.3	11.4	12.1
2.60*	10.7	10.2	7.7	11.9	12.1	12.8
2.77*	12.4	11.8	9.4	13.4	13.5	14.2
2.90*	13.2	12.7	10.2	14.1	14.3	14.9
2.97*	14.0	13.5	11.0	14.8	15.0	15.6
3.00*	2.5	2.0	-	4.8	4.9	5.6

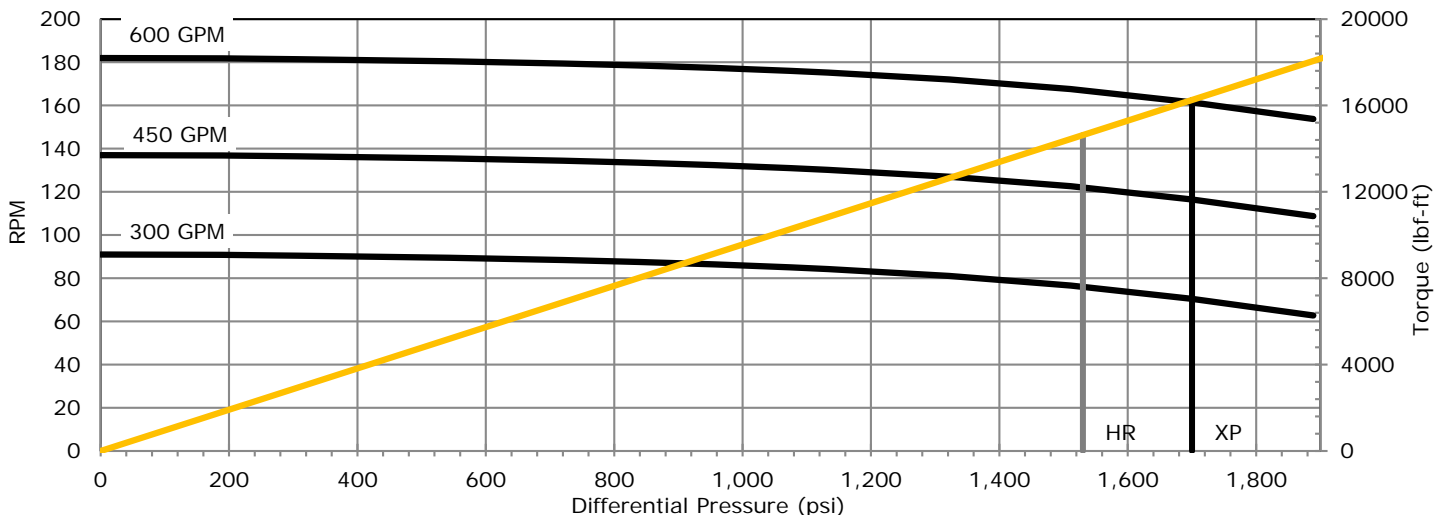
*Bend Setting not recommended for Rotary Drilling

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	-	-	-	2.8	2.9	3.6
1.00	1.8	1.2	-	5.1	5.3	6.0
1.25	4.2	3.6	-	7.4	7.5	8.2
1.50	6.5	5.9	3.0	9.5	9.6	10.3
1.63	8.7	8.1	5.1	11.5	11.6	12.3
1.75	10.6	10.0	7.0	13.2	13.4	14.0
1.88	12.3	11.7	8.8	14.8	14.9	15.6
2.00	13.8	13.1	10.2	16.1	16.2	16.9
2.25*	14.9	14.2	11.3	17.1	17.3	17.9
2.38*	15.8	15.1	12.2	17.9	18.1	18.7
2.50*	16.2	15.6	12.6	18.3	18.5	19.1

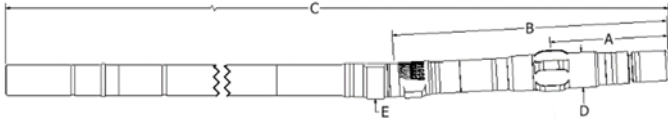
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



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

RVTF-77 : 4/5 Lobe 6.0 Stage



Dimensions

Bit to Stabilizer Center	A	28.3 in
Bit to Bend, ABH	B	79 in
Bit to Bend, Fixed	B	65 in
Bit to Top Sub	C	412 in
Body OD, Slick	D	7.75 in
Body OD, Stabilizer	D	9.25 in
Pad Radius, ABH	E	4.188 in
Pad Radius, Fixed	E	4.07 in
Bottom Connection	6-5/8 REG Box 6-5/8 REG Pin	
Top Connection	6-5/8 REG Box	
Top Sub Float Bore	5F-6R	

Recommended Operating Limits

Max WOB	143,000 lbf
Max Overpull, Backream	206,000 lbf
Max Overpull, Re-Run	256,000 lbf
Max Overpull, POOH	923,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	1350	1490 psi
Max Torque	15,300	16,830 lbf-ft
Stall Torque	22,950	25,250 lbf-ft
Rotation	0.246	0.246 rev/gal
Flow Range	400-900	400-900 gpm
Speed Range	98-230	98-230 rpm

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

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	9 7/8	10 5/8	12 1/4	9 7/8	10 5/8	12 1/4
Deg	9 7/8	10 5/8	12 1/4	9 7/8	10 5/8	12 1/4
0.39	-	-	-	2.5	2.8	3.6
0.78	2.2	-	-	4.5	4.8	5.6
1.15	4.4	3.1	-	6.4	6.7	7.5
1.50	6.5	5.2	2.2	8.1	8.5	9.3
1.83	8.5	7.1	4.2	9.8	10.2	10.9
2.12	10.2	8.8	5.9	11.3	11.7	12.4
2.38*	11.7	10.4	7.4	12.6	13.0	13.8
2.60*	13.0	11.7	8.7	13.8	14.1	14.9
2.77*	14.0	12.7	9.7	14.6	15.0	15.7
2.90*	14.8	13.4	10.5	15.3	15.6	16.4
2.97*	15.2	13.8	10.9	15.7	16.0	16.8
3.00*	15.4	14.0	11.1	15.8	16.2	16.9

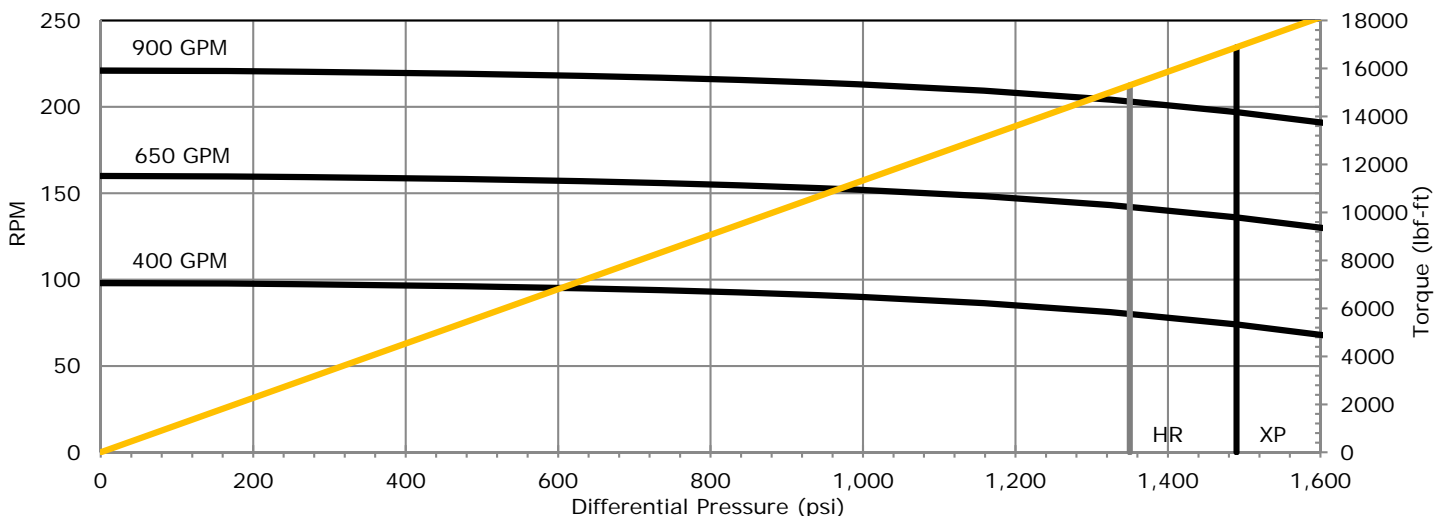
*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	9 7/8	10 5/8	12 1/4	9 7/8	10 5/8	12 1/4
Deg	9 7/8	10 5/8	12 1/4	9 7/8	10 5/8	12 1/4
0.75	-	-	-	4.5	4.8	5.6
1.00	2.4	-	-	5.8	6.2	6.9
1.25	3.9	2.3	-	7.2	7.5	8.3
1.50	5.4	3.8	-	8.5	8.8	9.6
1.63	6.2	4.6	1.1	9.2	9.5	10.3
1.75	6.9	5.3	1.8	9.8	10.2	10.9
1.88	7.3	5.7	2.3	10.3	10.6	11.4
2.00	8.3	6.8	3.3	11.2	11.5	12.3
2.25*	9.8	8.2	4.8	12.5	12.8	13.6
2.38*	10.6	9.0	5.5	13.2	13.5	14.3
2.50*	11.3	9.7	6.3	13.8	14.2	14.9

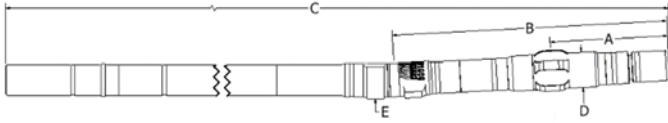
*Bend Setting not recommended for Rotary Drilling

Theoretical Performance Curve



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

RVTF-77 : 7/8 Lobe 4.0 Stage



Dimensions

Bit to Stabilizer Center	A	28.3 in
Bit to Bend, ABH	B	79 in
Bit to Bend, Fixed	B	65 in
Bit to Top Sub	C	355 in
Body OD, Slick	D	7.75 in
Body OD, Stabilizer	D	9.25 in
Pad Radius, ABH	E	4.188 in
Pad Radius, Fixed	E	4.07 in
Bottom Connection	6-5/8 REG Box 6-5/8 REG Pin	
Top Connection	6-5/8 REG Box	
Top Sub Float Bore	5F-6R	

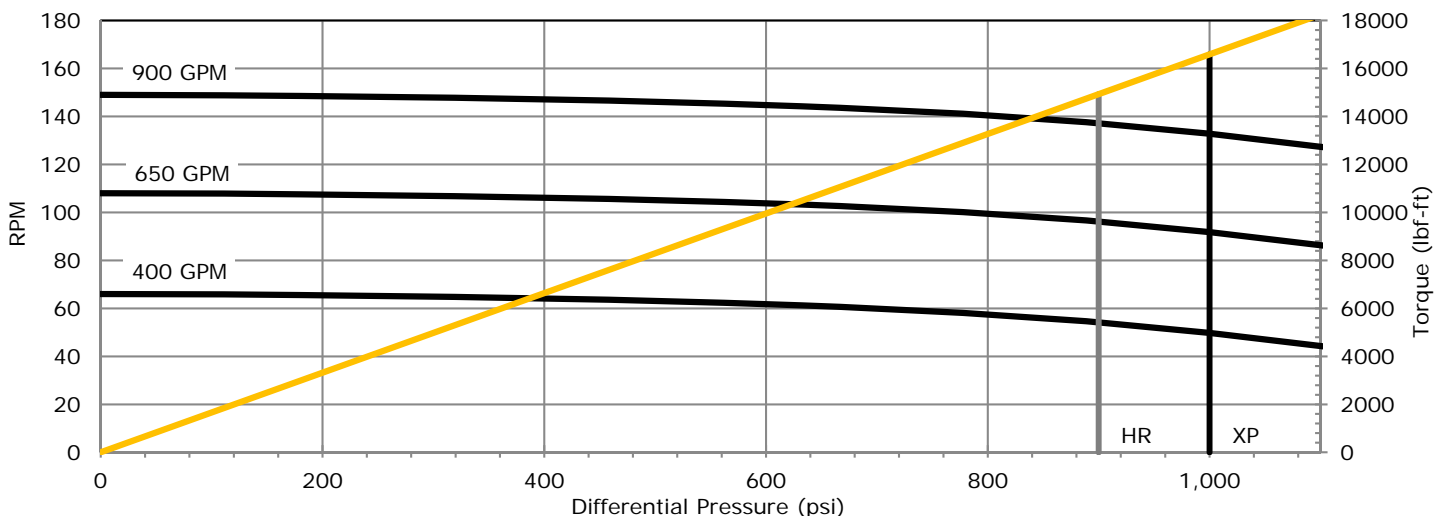
Recommended Operating Limits

Max WOB	143,000 lbf
Max Overpull, Backream	206,000 lbf
Max Overpull, Re-Run	256,000 lbf
Max Overpull, POOH	923,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	900	990 psi
Max Torque	14,930	16,420 lbf-ft
Stall Torque	22,400	26,640 lbf-ft
Rotation	0.166	0.166 rev/gal
Flow Range	400-900	400-900 gpm
Speed Range	66-150	66-150 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

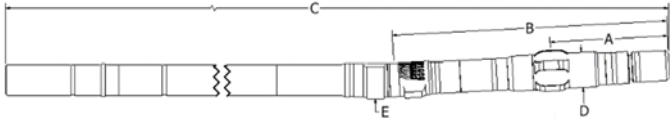
Bend Setting	Slick Hole Size			Stabilized Hole Size		
	9 7/8	10 5/8	12 1/4	9 7/8	10 5/8	12 1/4
Deg						
0.39	-	-	-	3.0	3.5	4.5
0.78	2.7	1.1	-	5.3	5.7	6.8
1.15	5.2	3.7	-	7.4	7.9	8.9
1.50	7.7	6.1	2.7	9.4	9.9	10.9
1.83	9.9	8.4	4.9	11.3	11.8	12.9
2.12	11.9	10.3	6.9	13.0	13.5	14.5
2.38*	13.7	12.1	8.7	14.5	15.0	16.0
2.60*	15.2	13.6	10.2	15.8	16.2	17.3
2.77*	16.4	14.8	11.4	16.7	17.2	18.3
2.90*	17.3	15.7	12.3	17.5	18.0	19.0
2.97*	17.8	16.2	12.8	17.9	18.4	19.4
3.00*	18.0	16.4	13.0	18.1	18.5	19.6

*Bend Setting not recommended for Rotary Drilling

Predicted Build Rates (Fixed) – Degrees/100ft

Bend Setting	Slick Hole Size			Stabilized Hole Size		
	9 7/8	10 5/8	12 1/4	9 7/8	10 5/8	12 1/4
Deg						
0.75	1.2	-	-	5.3	5.8	6.9
1.00	2.9	1.0	-	6.8	7.3	8.4
1.25	4.6	2.7	-	8.4	8.9	9.9
1.50	6.3	4.5	-	9.9	10.4	11.4
1.63	7.2	5.4	1.3	10.7	11.2	12.2
1.75	8.0	6.2	2.2	11.4	11.9	13.0
1.83	8.6	6.7	2.7	11.9	12.4	13.4
2.00	9.8	7.9	3.9	12.9	13.4	14.5
2.25*	11.5	9.6	5.6	14.5	14.9	16.0
2.38*	12.4	10.5	6.5	15.2	15.7	16.8
2.50*	13.2	11.3	7.3	16.0	16.5	17.5

*Bend Setting not recommended for Rotary Drilling

RVTF-47 : 4/5 Lobe 6.0 Stage

Dimensions

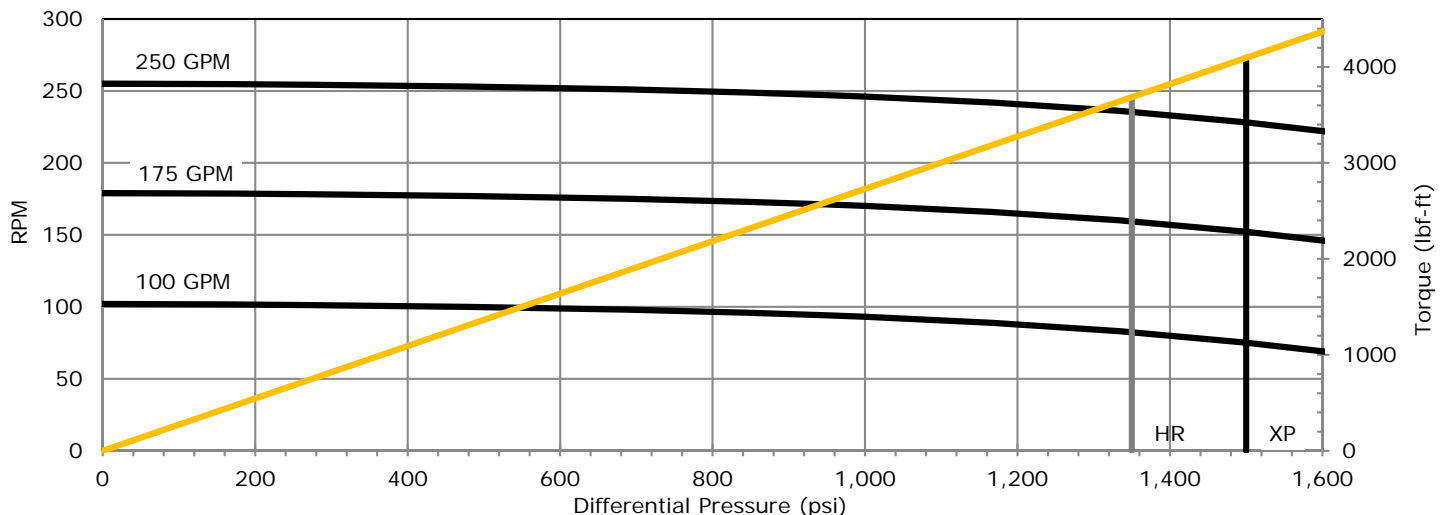
Bit to Stabilizer Center	A	16 in
Bit to Bend, ABH	B	57.5 in
Bit to Bend, Fixed	B	43.8 in
Bit to Top Sub	C	297 in
Body OD, Slick	D	4.818 in
Body OD, Stabilizer	D	5.50 in
Pad Radius, ABH	E	2.71 in
Pad Radius, Fixed	E	2.55 in
Bottom Connection	3-1/2 REG Box 3-1/2 IF Pin	
Top Connection	3-1/2 REG Box 3-1/2 IF Box, 3-1/2 XH Box	
Top Sub Float Bore	2F-3R, 3F, 3-1/2 IF	

Recommended Operating Limits

Max WOB	43,000 lbf
Max Overpull, Backream	62,000 lbf
Max Overpull, Re-Run	62,000 lbf
Max Overpull, POOH	320,000 lbf

Performance Details

	HR	XP
Max Diff Pressure	1,350	1,490 psi
Max Torque	3690	4060 lbf-ft
Stall Torque	5530	6080 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	1.8	-	-	2.5	2.7	3.1
0.78	5.0	4.1	2.3	5.2	5.4	5.8
1.15	8.1	7.2	5.4	8.1	8.0	8.4
1.50	10.9	10.0	8.2	10.9	10.4	10.8
1.83	13.6	12.7	10.9	13.6	12.7	13.1
2.12	16.0	15.1	13.3	16.0	15.1	15.1
2.38*	18.1	17.3	15.5	18.1	17.3	16.9
2.60*	20.0	19.1	17.3	20.0	19.1	18.5
2.77*	21.3	20.4	18.7	21.3	20.4	19.6
2.90*	22.4	21.5	19.7	22.4	21.5	20.5
2.97*	23.0	22.1	20.3	23.0	22.1	21.0
3.00*	23.2	22.3	20.5	23.2	22.3	21.2

*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	2.4	1.3	1.0	5.3	5.5	6.8
1.00	4.5	3.3	1.1	7.1	7.3	7.8
1.25	6.5	5.4	3.1	9.0	9.2	9.6
1.50	8.6	7.4	5.2	10.8	11.0	11.5
1.63	9.6	8.5	6.2	11.8	12.0	12.4
1.75	10.6	9.5	7.2	12.6	12.9	13.3
1.83	11.3	10.1	7.9	13.2	13.4	13.9
2.00	12.7	11.5	9.3	14.5	14.7	15.1
2.25*	14.7	13.6	11.3	16.3	16.5	17.0
2.38*	15.8	14.7	12.4	17.3	17.5	17.9
2.50*	16.8	15.6	13.4	18.2	18.4	18.8

*Bend Setting not recommended for Rotary Drilling