

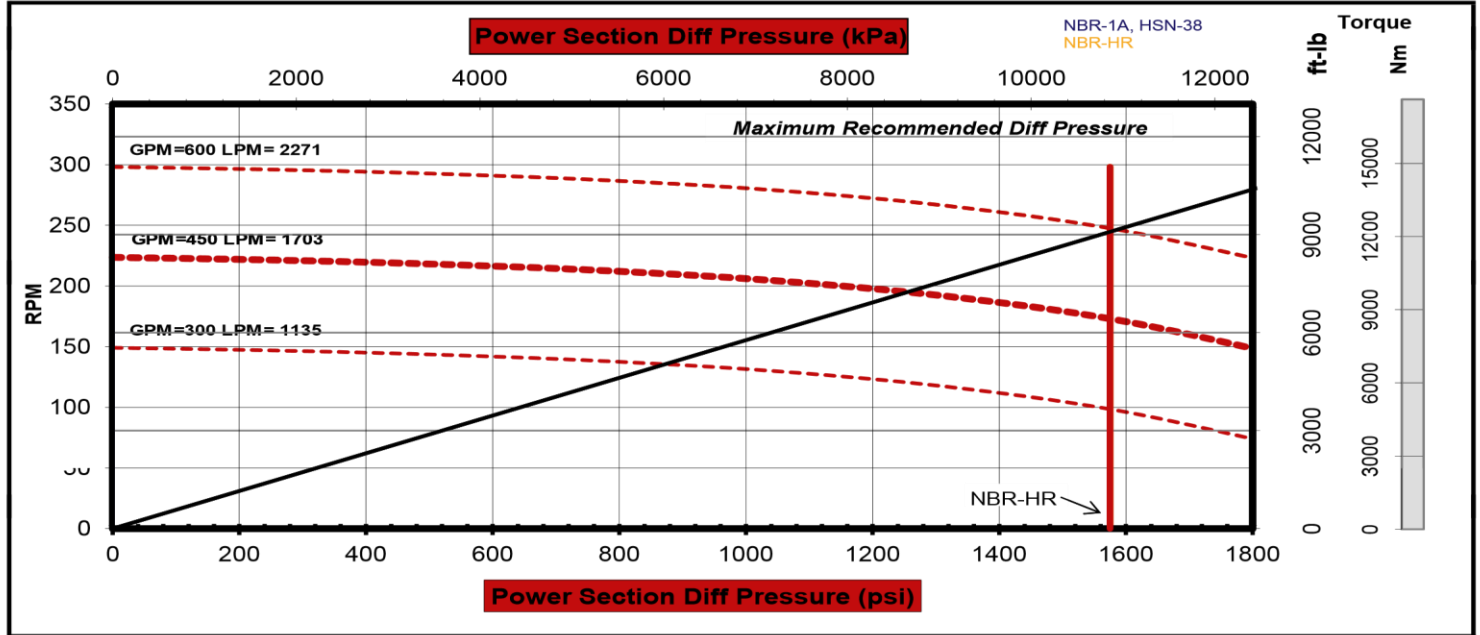


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SHORT SUPERHAWK 650 – 4:5 Profile 7.0 Stage HR - 6 1/2" O.D.

| GENERAL DATA | | | |
|----------------------|--------------------|----------------------------|-------------|
| BIT SIZES | 7 7/8" thru 9 7/8" | MAX. WOB – (w/flow) | 70,000 lbs |
| BIT CONNECTION | 4 1/2 REG | OPTIMUM WOB - (w/flow) | 35,000 Lbs |
| TOP CONNECTION | 4 1/2 IF | MAX. WOB – (w/o flow) | 140,000 lbs |
| TORQUE - CONNECTIONS | 25,000 ft-lb | MAX. BIT PULL – (w/damage) | 180,000 lbs |
| TORQUE - ABH | 28,500 ft-lb | MAX BODY PULL – (w/damage) | 625,000 lbs |

| PHYSICAL PROPERTIES | |
|----------------------------|----------------|
| BIT TO BEND LENGTH (ABH) | 65.32 in. |
| BIT TO BEND LENGTH (FIXED) | 43 in. |
| NOMINAL LENGTH | 330 in. |
| WEIGHT | 1960 lbs |
| PERFORMANCE DATA | |
| FLOW RANGE | 300 - 600 gpm |
| SPEED RANGE | 149 - 300 rpm |
| SPEED RATIO | .497 rev/gal |
| MAX. DIFFERENTIAL PRESSURE | 1,580 psi |
| TORQUE RATIO | 5.77 ft-lb/psi |
| TORQUE AT MAX DIFFERENTIAL | 9,090 ft-lbs |
| STALL TORQUE | 13,630 ft-lbs |



| Angle (Deg) | CALCULATED BUILD UP RATES – DEGREES / 100 ft.* (FIXED) | | | | | | | |
|-------------|--------------------------------------------------------|--------|--------|--------|-----------------------------|--------|--------|--------|
| | Hole Size (in) – Slick Sleeve | | | | Hole Size (in) - Stabilized | | | |
| | 7 7/8" | 8 1/2" | 8 3/4" | 9 7/8" | 7 7/8" | 8 1/2" | 8 3/4" | 9 7/8" |
| 0.25 | 2.4 | 1.4 | 1.0 | | 1.8 | 2.2 | 2.3 | 3.1 |
| 0.50 | 3.7 | 2.7 | 2.3 | | 3.4 | 3.8 | 4.0 | 4.7 |
| 0.75 | 5.1 | 4.1 | 3.7 | 1.9 | 5.1 | 5.5 | 5.6 | 6.4 |
| 1.00 | 6.5 | 5.5 | 5.1 | 3.2 | 6.7 | 7.1 | 7.3 | 8.0 |
| 1.25 | 7.8 | 6.8 | 6.4 | 4.6 | 8.4 | 8.8 | 8.9 | 9.7 |
| 1.50 | 9.2 | 8.2 | 7.8 | 6.0 | 10.0 | 10.4 | 10.6 | 11.3 |
| 1.75 | 10.6 | 9.5 | 9.1 | 7.3 | 11.6 | 12.1 | 12.2 | 13.0 |
| 2.00 | 11.9 | 10.9 | 10.5 | 8.7 | 13.3 | 13.7 | 13.9 | 14.6 |
| 2.25 | 13.3 | 12.3 | 11.9 | 10.0 | 14.9 | 15.3 | 15.5 | 16.2 |
| 2.50 | 14.6 | 13.6 | 13.2 | 11.4 | 16.6 | 17.0 | 17.2 | 17.9 |
| 2.75 | 16.0 | 15.0 | 14.6 | 12.8 | 18.2 | 18.6 | 18.8 | 19.5 |
| 3.00 | 17.4 | 16.4 | 16.0 | 14.1 | 19.9 | 20.3 | 20.4 | 21.2 |

| Angle (Deg) | CALCULATED BUILD UP RATES – DEGREES / 100 ft.* (ABH) | | | | | | | |
|-------------|------------------------------------------------------|--------|--------|--------|-----------------------------|--------|--------|--------|
| | Hole Size (in) – Slick Sleeve | | | | Hole Size (in) - Stabilized | | | |
| | 7 7/8" | 8 1/2" | 8 3/4" | 9 7/8" | 7 7/8" | 8 1/2" | 8 3/4" | 9 7/8" |
| 0.25 | 1.1 | 0.6 | | | 1.6 | 2.1 | 2.2 | 3.0 |
| 0.50 | 2.5 | 2.0 | 1.8 | | 3.2 | 3.6 | 3.7 | 4.5 |
| 0.75 | 3.9 | 3.4 | 3.2 | 2.3 | 4.7 | 5.1 | 5.3 | 6.0 |
| 1.00 | 5.3 | 4.8 | 4.6 | 3.7 | 6.2 | 6.6 | 6.8 | 7.5 |
| 1.25 | 6.6 | 6.1 | 5.9 | 5.0 | 7.7 | 8.1 | 8.3 | 9.0 |
| 1.50 | 8.0 | 7.5 | 7.3 | 6.4 | 9.2 | 9.6 | 9.8 | 10.5 |
| 1.75 | 9.4 | 8.9 | 8.7 | 7.8 | 10.7 | 11.2 | 11.3 | 12.1 |
| 2.00 | 10.7 | 10.2 | 10.0 | 9.1 | 12.3 | 12.7 | 12.8 | 13.6 |
| 2.25 | 12.1 | 11.6 | 11.4 | 10.5 | 13.8 | 14.2 | 14.4 | 15.1 |
| 2.50 | 13.5 | 13.0 | 12.8 | 11.9 | 15.3 | 15.7 | 15.9 | 16.6 |
| 2.75 | 14.9 | 14.4 | 14.2 | 13.2 | 16.8 | 17.2 | 17.4 | 18.1 |
| 3.00 | 16.2 | 15.7 | 15.5 | 14.6 | 18.3 | 18.7 | 18.9 | 19.7 |

* Actual Build Up Rates subject to varying factors; including formation, weight on bit.