

WR2 Electrical Submersible Pump

Wear Resistant Wide Range ESP for operation in ultra demanding applications

Applications

- Unconventional and conventional wells
- Wells with unstable or rapidly declining flowrate
- Wells producing sand or solids
- Gassy wells
- Viscous oil wells

Features & Benefits

- Extended operating range reduces frequency and cost of ESP replacements
- High-reliability pump design results in the increased run life
- Abrasion resistant stages provide stable pump head during the entire ESP run life
- The unique stage design eliminates pump plugging even when sand production comes in bursts
- Extremely high strength stage material with a hardness similar to tungsten carbide
- No shimming required
- Up to 70% pump efficiency
- Up to 55% gas handling
- Up to 75% gas handling with a vortex gas separator
- Up to 3 g/l solids handling
- Up to 500 cSt fluid kinematic viscosity

The Borets solution for unconventional oil plays facilitates the operation of pumping systems in the harshest downhole conditions, including wells subject to frac sands. This solution features the innovatively designed energy-efficient Borets Wide Range Wear Resistant (WR2) electrical submersible pump.

The high-efficiency WR2 ESP is ideally suited for a wide range of production, extends ESP system run life and minimizes well interventions. The WR2 product line covers flow rates from 190 bpd to 4,400 bpd.

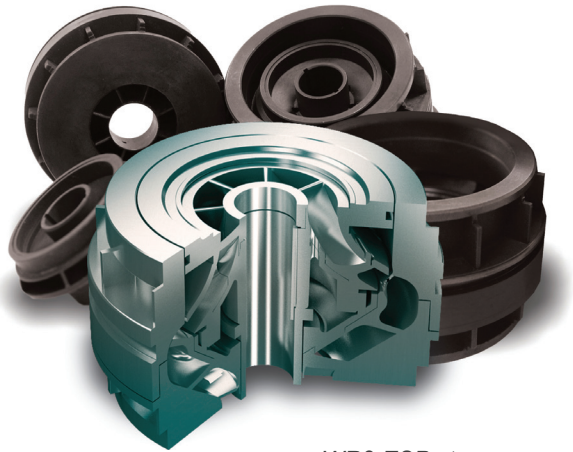
WR2 pump stage is manufactured with innovative Metal Injection Molding (MIM) process instead of conventional casting.

This technology allows unlimited stage geometry, customized alloys, and much smoother surface finish. The MIM process provides the unlimited material options with the maximum hardness of 57 HRC, which is equivalent to tensile strength limit of 2,100 MPa (304.5 Ksi).



WR2 ESP specifications @ 6,000 rpm

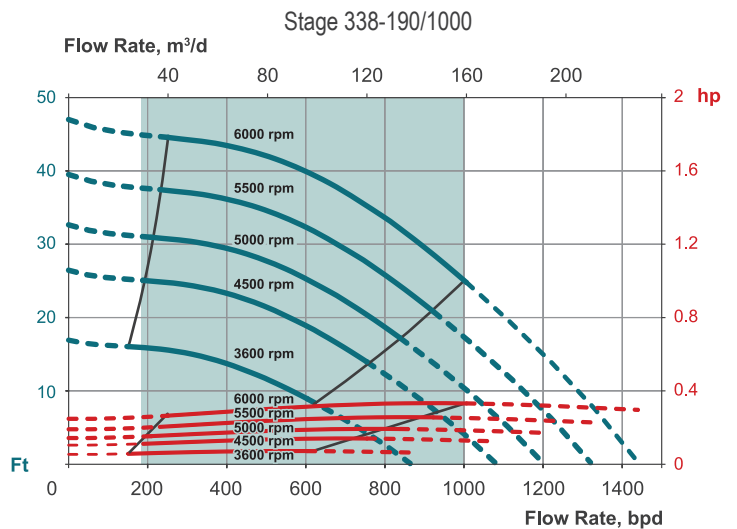
	338-190/1000	338-560/1900	362-800/4400
Flow range, bpd (m ³ /d)	190 – 1,000 (30 – 160)	560 – 1,900 (90 – 300)	800 – 4,400 * (140 – 700 *)
Pump OD, in. (mm)	3.38 (86)	3.38 (86)	3.62 (92)
Head per stage @ BEP, ft (m)	30.7 (9.4)	37.4 (11.4)	33.81 (10.3) *
Power per stage @ BEP, hp (kW)	0.370 (0.276)	0.59 (0.44)	1.287 (0.959) *
Efficiency @ BEP, %	60	63	70
Stage geometry	advanced mixed flow		
Shaft alloys	stainless steel, MONEL K-500, INCONEL 718		
Shaft diameter, in. (mm)	0.5906 (15.0)	0.5906 (15.0)	0.787 (20.0)
Bearing material	tungsten carbide		



WR2 ESP stages

Pump Performance Curves

Curve computed for one stage in 1.00 s.g. fluid.



The operators are benefit from the best-in-class abrasion and corrosion resistance properties of WR2 stage alloys.

The WR2 ESP stages are assembled in stacks (packets). Every packet of stages is located on a separate shaft and incorporates thrust bearings and radial bearings. The impellers are rigidly fixed to the shaft.

The hydraulically balanced stages reduce downthrust wear even when the pump is operated outside the recommended operating range.

The optimized impeller vane geometry greatly enhances the operating range as compared to the conventional ESP designs. The thrust bearings provided in every packet of stages result in less stress on the system, higher reliability and longer operating life.

The advanced mixed-flow design allows gas to pass more easily through the pump compared to a radial-flow stage, thus mitigating gas locking issues that reduce ESP system run life.

Borets manufactures WR2 pump stages at its brand new state-of-the-art facility opened in 2015, thus ensuring control in quality and costs.

