

# ELECTRIC SUBMERSIBLE PROGRESSING CAVITY PUMPS

Maximize Efficiency On Any Rod Less Lift System With Lifting Solutions' Progressing Cavity Pumps For ESPCP Systems

## PRODUCT OVERVIEW

Lifting Solutions progressing cavity pumps (PCP) are designed, engineered and manufactured to optimize rod less electrical submersible progressing cavity pumping (ESPCP) systems.

## CHALLENGE

When a conventional surface driven PCP system is not an option, or its associated rod string presents difficult challenges in terms of frequent wear or fatigue failures generating unacceptable levels of tubing wear, then a downhole driven ESPCP system is a viable option for consideration. The ESPCP system removes the surface equipment and the rod string and drives the PC pump through a downhole motor. Recent improvements in downhole motor technology, including permanent magnet motors, combined with Lifting Solutions fit-for-purpose designed and precision manufactured PC pumps are yielding favorable results in ESPCP applications.

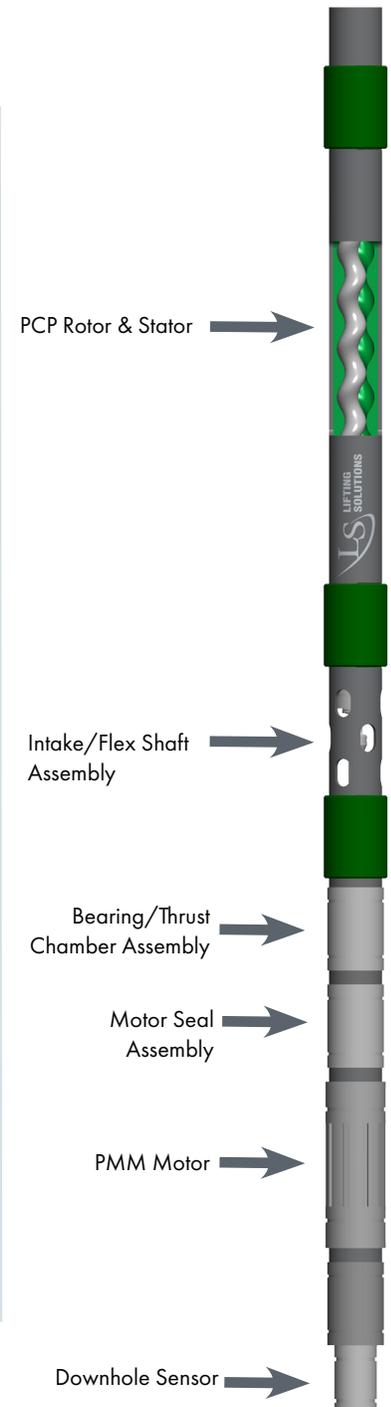
## PROGRESSING CAVITY PUMPS THAT OUTPERFORM

Lifting Solutions has a strategic model offering containing fit-for-purpose geometries optimized for various wellbore environments. Our specialized PC Pump product line is designed to target ESPCP challenges head-on.

Our applications team dives into the challenges of each wellbore environment to find the right PC Pump that will elevate the ESPCP performance to maximize operation of your well. We are a dedicated team of PCP experts from engineering and design to manufacturing and application.

## PCP PRODUCT FEATURES AND BENEFITS

- Fit-for-purpose geometries optimized for a range of wellbore and application environments including heavy oil, medium and light oil and coal seam gas.
- Engineered elastomer designed for a wide range of applications.
- Eight series of PC Pumps with over 40 models including conventional, slim hole, CHOPS and insertable configurations.
- Pump capacity range from 2 to 280 m<sup>3</sup>/day/100rpm (12 to 1760 bbl/day/100rpm).
- Pumps are designed and manufactured to tight centralization tolerances, reducing fatigue and vibration.
- Optimized for low operating and breakaway torque decreasing motor torque requirements and power consumption.
- Proprietary elastomers engineered for a wide range of applications.
- Modern internal PC Pump manufacturing facility that is ISO 9001:2015 certified with full ISO 15136-1 compliance capabilities.
- Application engineering dedicated to supporting our clients during the design, troubleshooting, post run inspection/failure analysis phases of applications support.



## PRODUCT LINE OVERVIEW

| Series<br>Stator Tube OD | Model Range<br>m3/day/100rpm | Model Range<br>bbls/day/100rpm | Standard Stator Connection |               | Rotor Connection        | Max Lift   |
|--------------------------|------------------------------|--------------------------------|----------------------------|---------------|-------------------------|--|
|                          |                              |                                | Size in (mm)               | OD in (mm)    | Size in (mm)            | Meters (feet)                                      |
| 2-3/8"                   | 2 to 23                      | 13 B to 145 B                  | 2-3/8 (60.3)<br>NUE Pin    | 2.88 (73.0)   | 3/4 (19.1)<br>API Pin   | 1000m to 3600m<br>(3300ft to 11800ft) <sup>1</sup> |
| 2.75"                    | 7 to 62                      | 44 B to 390 B                  | 2-3/8 (60.3)<br>NUE Box    | 2.75 (69.9)   | 3/4 (19.1)<br>API Pin   | 1000m to 3000m<br>(3300ft to 9800ft)               |
| 3-1/8"                   | 4 to 7                       | 25 B to 44 B                   | 2-7/8 (73.0)<br>EUE Pin    | 3.46 (87.9)*  | 7/8 (22.2)<br>API Pin   | 3600m<br>(11800ft)                                 |
| 3-1/2"                   | 10 to 70                     | 63 B to 440 B                  | 2-7/8 (73.0)<br>EUE Box    | 3.50 (88.9)   | 7/8 (22.2)<br>API Pin   | 1200m to 3600m<br>(3900ft to 11800ft)              |
| 3-3/4"                   | 8 to 155                     | 50 B to 975 B                  | 3-1/2 (88.9)<br>EUE Pin    | 4.18 (106.2)* | 1 (25.4)<br>API Pin     | 900m to 3600m<br>(3950ft to 11800ft)               |
| 4-1/8"                   | 23 to 190                    | 145 B to 1195 B                | 3-1/2 (88.9)<br>EUE Box    | 4.13 (104.8)  | 1 (25.4)<br>API Pin 1   | 800m to 3600m<br>(2600ft to 11800ft)               |
| 4-3/4"                   | 35 to 280                    | 220 B to 1761 B                | 4-1/2 (114.3)<br>EUE Pin   | 5.56 (141.2)  | 1-1/8 (28.6)<br>API Pin | 800m to 3600m<br>(2600ft to 11800ft)               |
| 5"                       | 56 to 215                    | 352 B to 1352 B                | 5 (127.0)<br>LTC Pin       | 5.56 (141.2)  | 1-1/8 (28.6)<br>API Pin | 1000m to 2400m<br>(3300ft to 7900ft)               |

\*API special clearance coupling ODV

## ELASTOMER

| Elastomer Code | Typical Applications  | Nitrile Level (% ACN) | Hardness (Shore A) | Maximum Downhole Temperature <sup>1</sup> | Resistance Guide                          |           |           |                  |                  |                                     |
|----------------|---|-----------------------|--------------------|---|---|-----------|-----------|------------------|------------------|-------------------------------------|
|                |   |                       |                    |   | Oil                                       | Water     | Abrasive  | Gas <sup>3</sup> | H <sub>2</sub> S | CO <sub>2</sub>                     |
| SN1            | Heavy oil (CHOPS), high abrasives   | 32 to 36              | 55 to 60           | 60°C (140°F)                              | Up to 15 API                              | Very Good | Excellent | Fair             | Fair             | Fair                                |
| MN1            | Heavy to moderate oil, moderate abrasives, dewatering (CSG/CBM)                     | 32 to 36              | 65 to 70           | 80°C (176°F)<br>100°C (212°F) for CSG/CBM | Up to 20 API<br>(Max 25 API) <sup>2</sup> | Very Good | Very Good | Good             | Good             | Good                                |
| HN2            | Medium to light oil, high CO <sub>2</sub> , chemical treatment, deeper/hotter wells | 45 to 50              | 70 to 75           | 100°C (212°F)                             | Up to 35 API<br>(Max 45 API) <sup>2</sup> | Very Good | Good      | Very Good        | Good             | Very Good<br>Excellent <sup>4</sup> |

<sup>1</sup> LS can provide technical documentation on the temperature rating methodology upon request.

<sup>2</sup> Suitability of upper API gravity depends on specific application conditions including oil chemistry, water cut, and temperature.

<sup>3</sup> Gas & explosive-decompression resistance is a concern primarily with CO<sub>2</sub> since methane (CH<sub>4</sub>) permeability is significantly lower in elastomers.

<sup>4</sup> HN-ED Explosive Decompression elastomer formulation is available for high CO<sub>2</sub> applications. This elastomer is custom order.