Production Service Hookup
Artificial lift

We deliver a field-proven, highly engineered, comprehensive resource for artificial lift equipment and packaged solutions all over the world. Our breakthrough innovations in hydraulic rod pumping systems, progressing cavity pump systems (PCP), and automation controls and monitoring are changing the way operators view their long-term production through artificial lift. Our artificial lift professionals will collaborate with you to properly evaluate well conditions and provide customized solutions, helping you to optimize your production for the life of your wells.

Let us be your new 24/7 production partner.

Production service hookup

Our products are recognized for a superior quality and design, unsurpassed in the oilfield. From the largest range of stuffing boxes and production blowout preventers to the most comprehensive line of polished rod accessories, our equipment can complete a total hookup for your progressing cavity pump and rod pumping applications.

Our products include:
- Stuffing boxes and packing
- Blowout preventers
- Tubing and rod rotators
- Polished rod accessories
- Wellheads
- Hookup accessories

With over 70 years of manufacturing experience, we offer specific designs of production service hookup configurations based on the demands of your well and type of application. Our customers are constantly seeking solutions that allow them to meet their operational goals. In order to achieve their objectives, we focus our designs on:
- Safety
- Pressure control
- Wear prevention
- Maximizing production
- Minimizing downtime
- Well monitoring

Types of configurations

Our available production service hookup can be designed as a complete system:
- Progressing cavity pump service hookup
- Low-pressure rod pump service hookup
- High-pressure rod pump service hookup

Aftermarket

Our products are backed by the reliability and responsiveness of our Services and Aftermarket group. Highly trained field service technicians are on call to handle on-site service needs, 24 hours a day, seven days a week. For the long-term support of our products, we offer refurbishment services to bring your existing equipment back to original factory specification.

Our services include:
- Equipment installation and commissioning
- On-site service repair
- Remote diagnostic service
- Equipment refurbishment
Stuffing Boxes

Our range of Hercules™ stuffing boxes provides a superior seal against different types of applications. We offer classic, high-performance, pollution-control, high-temperature products, and accessories.

Classic Stuffing Boxes

Single Pack Stuffing Box (SB)
- Original design
- Superior and dependable performance
- Standard model has lube upper gland (LUG) with grease zerk
- Optional oil reservoir gland (ORG) and APA control device
- Unique misaligning feature reduces need for exact alignment with the pumping unit
- LUG and ORG have two heavy hex nuts on each bolt, which can support up to 20,000 lb when engaged during well servicing

Tee Base Stuffing Box (SBT)
- Combines SB and cross tee with 1-in. blower
- Eliminates one threaded connection
- Side outlets:
  - 2-in. LP with 2-in. bottom connection
  - 3-in. LP with 2½-in. or 3-in. bottom connection
- Standard model has LUG with grease zerk
- Optional ORG and APA control device
- LUG has two heavy hex nuts on each bolt, which can support up to 20,000 lb when engaged during well servicing

Double Packed Stuffing Box (DPSB)
- Most widely used stuffing box in the industry
- Primary packing can be changed under pressure by tightening compression bolts
- Unique misaligning feature reduces need for exact alignment with the pumping unit
- Adaptable to many accessories
- Standard model has LUG with grease zerk
- Optional ORG and APA control device
- LUG has two heavy hex nuts on each bolt, which can support up to 20,000 lb when engaged during well servicing
- Flanged bottom connection available

Regular Inverted Stuffing Box (IVSB)
- Lowest profile design
- Ideal for smaller pumping units
- Furnished with three “top cones” and one “bottom cone.” One top cone (thin cone) can be removed to reduce overall height even further without impairing pressure rating (if reduced packing life is acceptable)
- A polished rod support (PRS) is required during well servicing to prevent the transfer of rod string weight to the packing (see page 24)

Tee Base Inverted Stuffing Box (IVSBT)
- Combines IVSB and cross tee with 1-in. blower
- Eliminates one threaded connection
- Lower profile than classic models
- Side outlets:
  - 2-in. LP with 2-in. bottom connection
  - 3-in. LP with 2½-in. or 3-in. bottom connection
- Furnished with three “top cones” and one “bottom cone.” One top cone (thin cone) can be removed to reduce overall height even further without impairing pressure rating (if reduced packing life is acceptable)
- A PRS is required during well servicing to prevent the transfer of rod string weight to the packing (see page 24)

Double-Packed Inverted Stuffing Box (IVDPSB)
- Exceptionally rugged, built for performance under tough conditions
- Primary packing can be changed under pressure by tightening compression bolts
- Lower profile than classic model
- Furnished with three “top cones” and one “bottom cone.” One top cone (thin cone) can be removed to reduce overall height even further without impairing pressure rating (if reduced packing life is acceptable)
- A PRS is required during well servicing to prevent the transfer of rod string weight to the packing (see page 24)
- Flanged bottom connection available
### Classic Stuffing Boxes Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>SB</th>
<th>SBT</th>
<th>DPSB</th>
<th>IVSB</th>
<th>IVSBT</th>
<th>IVDPSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working pressure</td>
<td>1,500 psi</td>
<td>1,500 psi</td>
<td>1,500 psi</td>
<td>1,500 psi</td>
<td>1,500 psi</td>
<td>1,500 psi</td>
</tr>
<tr>
<td>Bottom thread (API tubing or LP)</td>
<td>2, 2½, 3 in.</td>
<td>2, 2½, 3 in.</td>
<td>2, 2½, 3 in.</td>
<td>2, 2½, 3 in.</td>
<td>2, 2½, 3 in.</td>
<td>2, 2½, 3 in.</td>
</tr>
<tr>
<td>Bottom connection</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Weight (lb</td>
<td>2 in.</td>
<td>24 lb</td>
<td>25 lb</td>
<td>26 lb</td>
<td>28 lb</td>
<td>30 lb</td>
</tr>
<tr>
<td></td>
<td>3 in.</td>
<td>33 lb</td>
<td>37 lb</td>
<td>42 lb</td>
<td>46 lb</td>
<td>46 lb</td>
</tr>
<tr>
<td></td>
<td>4 in.</td>
<td>55 lb</td>
<td>57 lb</td>
<td>52 lb</td>
<td>51 lb</td>
<td>56 lb</td>
</tr>
<tr>
<td></td>
<td>13½ in.</td>
<td>26 lb</td>
<td>26 lb</td>
<td>24 lb</td>
<td>17 lb</td>
<td>17 lb</td>
</tr>
<tr>
<td>Material</td>
<td>Ductile iron*</td>
<td>Ductile iron*</td>
<td>Ductile iron*</td>
<td>Ductile iron*</td>
<td>Ductile iron*</td>
<td>Ductile iron*</td>
</tr>
<tr>
<td>Split cone packing-rod sizes</td>
<td>1, 1¼, 1½, 1¾, 1⅛, 1⅝, 1⅜, 1⅝, 1⅜, 1⅝ in.</td>
<td>1, 1¼, 1½, 1¾, 1⅛, 1⅝, 1⅜, 1⅝, 1⅜, 1⅝ in.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pieces required</td>
<td>Top cones</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Bottom cones</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Corrosion-resistant coatings available; contact customer service.
**Add 11 lb if equipped with optional HPL UG.

### Classic Stuffing Box

- Log gland-cap bolt
- Log gland-cap
- Log gland body with zerk
- Upper gland bolts
- Split cone packing rings
- Compression bolt packing nut
- Flange bolts
- Compression bolt
- Compression ring
- O-ring

### High-Performance Stuffing Boxes

#### Big Stuff DPSB
- Easy to adjust threaded cap-no bolts to tighten
- Cone packing is inverted to achieve a pressure-assisted seal
- Reduces costly packing maintenance time
- Packing compression forces are distributed evenly
- Ideal for short stroke pumping units
- Convenient protection of packing from weight of rod string
- Polished rod lubricator is highly recommended, as a grease zerk is not available due to the low profile
- Available with adapters for APA control device or Hercules stuffing box leak detector
- Flanged bottom connection available

#### NACE Big Stuff DPSB
- Meets NACE MR0175
- High-pressure service: 3,000 psi max CWP
- Cone packing is inverted to achieve a pressure-assisted seal
- Exceptionally rugged, built for performance under tough conditions
- Primary packing can be changed under pressure by tightening compression bolts to temporarily engage secondary packing
- Two ¼-in NPT ports (180° apart) for installation of needle valve and grease zerk or pressure gauge, if desired by operator
- Convenient protection of packing from weight of rod string
- Available with adapters for APA control device or Hercules stuffing box leak detector
- Flanged bottom connection available
High-Performance Stuffing Box Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Big Stuff</th>
<th>Big Stuff DPSB</th>
<th>NACE Big Stuff</th>
<th>NACE Big Stuff DPSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working pressure</td>
<td>1,500 psi</td>
<td>1,500 psi</td>
<td>3,000 psi</td>
<td>3,000 psi</td>
</tr>
<tr>
<td>Bottom thread</td>
<td>2, 2½, 3, 4 in.</td>
<td>2, 2½, 3, 4 in.</td>
<td>Male</td>
<td>Male</td>
</tr>
<tr>
<td>Weight</td>
<td>3 in.</td>
<td>20 lb</td>
<td>45 lb</td>
<td>20 lb</td>
</tr>
<tr>
<td></td>
<td>2½ in.</td>
<td>21 lb</td>
<td>45 lb</td>
<td>21 lb</td>
</tr>
<tr>
<td></td>
<td>3 in.</td>
<td>21 lb</td>
<td>46 lb</td>
<td>21 lb</td>
</tr>
<tr>
<td></td>
<td>4 in.</td>
<td>27 lb</td>
<td>49 lb</td>
<td>27 lb</td>
</tr>
<tr>
<td>(Height, includes pin connection)</td>
<td>35 in.</td>
<td>51 in.</td>
<td>51 in.</td>
<td>51 in.</td>
</tr>
<tr>
<td>Working pressure</td>
<td>3,000 psi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom thread</td>
<td>2, 2½, 3, 4 in.</td>
<td>Male</td>
<td>Male</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>2 in.</td>
<td>20 lb</td>
<td>45 lb</td>
<td>47 lb</td>
</tr>
<tr>
<td></td>
<td>2½ in.</td>
<td>21 lb</td>
<td>45 lb</td>
<td>47 lb</td>
</tr>
<tr>
<td></td>
<td>3 in.</td>
<td>21 lb</td>
<td>46 lb</td>
<td>48 lb</td>
</tr>
<tr>
<td></td>
<td>4 in.</td>
<td>27 lb</td>
<td>49 lb</td>
<td>51 lb</td>
</tr>
<tr>
<td>Maximum body/cap load</td>
<td>32,000 lb for 2 in.</td>
<td>11.5 LV and 40,000 lb for all other sizes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body and cap material</td>
<td>Ductile iron*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split cone packing - rod sizes</td>
<td>1⅛, 1⅛, 1¼, 15/16, 1⅛ in.</td>
<td>1⅛, 1¼, 15/16, 1⅛ in.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pieces required:</td>
<td>3 5 3 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom cone</td>
<td>1 1 1 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Corrosion-resistant coatings available; contact customer service.

Pollution-Control Stuffing Box Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Classic PCSB</th>
<th>NACE Big Stuff PCSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working pressure</td>
<td>1,500 psi</td>
<td>3,000 psi</td>
</tr>
<tr>
<td>Bottom thread</td>
<td>2, 2½, 3 in.</td>
<td>2, 2½, 3 in.</td>
</tr>
<tr>
<td>Bottom connection</td>
<td>Male or flanged</td>
<td>Male or flanged</td>
</tr>
<tr>
<td>Weight</td>
<td>2 in.</td>
<td>105 lb</td>
</tr>
<tr>
<td></td>
<td>2½ in.</td>
<td>110 lb</td>
</tr>
<tr>
<td></td>
<td>3 in.</td>
<td>115 lb</td>
</tr>
<tr>
<td>Height (threaded)</td>
<td>24½ in.</td>
<td>25¼ in.</td>
</tr>
<tr>
<td>Material</td>
<td>Low-temperature steel</td>
<td>Low-temperature steel</td>
</tr>
<tr>
<td>Flapper</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Body and packing glands</td>
<td>Ductile iron*</td>
<td>Ductile iron and carbon steel (HPLUG body)</td>
</tr>
<tr>
<td>Spilt cone packing - rod sizes</td>
<td>1⅛, 1⅛, 1¼, 1⅛ in.</td>
<td>1⅛, 1¼, 1⅛ in.</td>
</tr>
<tr>
<td>Pieces required:</td>
<td>5 5</td>
<td>1 1</td>
</tr>
<tr>
<td>V-ring packing ID</td>
<td>2⅞ in.</td>
<td>2⅞ in.</td>
</tr>
<tr>
<td>V-ring stack height</td>
<td>3 in.</td>
<td>3 in.</td>
</tr>
</tbody>
</table>

* Corrosion-resistant coatings available; contact customer service.

Pollution-Control Stuffing Boxes (PCSBS)

- Classic PCSB & NACE Big Stuff PCSB
  - An enhanced version of Hercules DPSB using PCSB
  - Adapter unit below the BOP section and HPLUG is replaced with PCSB upper gland (aka Hercules HPLUG) if polished rod breaks below stuffing box, flapper closes automatically
  - Two independently adjustable packing chambers—primary cone packing in DPSB body and V-ring packing in PCSB upper gland (V-rings contain full working pressure)
  - Pollution-control adapter acceptable to -50°F (-45.5°C)
  - Pollution-control adapter meets NACE MR0175
  - Base has ½-in. NPT test port
  - Adaptable to API control device or Hercules SB leak detector
  - Primary packing can be changed under pressure
  - Unique misaligning feature in classic PCSB reduces need for exact alignment with the pumping unit
  - Flanged bottom connection available
  - Available with 1,500- or 3,000-psi Big Stuff DPSB top section (with or without HPLUG) In HPLUG versions, only designed for 1,500 psi.
  - Corrosion-resistant coating available
  - Available with Dom* primary packing (V-ring packing for PCSB is not interchangeable with HTD V-ring packing)

Classic PCSB can be ordered with: 1/2 in. 5/16, 1/3 in., 1/5 in. 1/8 in. 1/3 in., 1/5 in. 1/8 in.

NACE Big Stuff PCSB cannot be ordered with: 1/2 in. 5/16, 1/3 in., 1/5 in. 1/8 in. 1/3 in., 1/5 in. 1/8 in.
High-Temperature Stuffing Boxes

High-Temperature Double-Packed Stuffing Box (HTD)
- Designed for high-pressure and high-temperature wells.
- Meets NACE MR0175.
- Lower packing can be temporarily energized by loosening lock ring and tightening upper body to allow changing primary packing under pressure.
- Dual packing chamber.
- Primary packing can be changed under pressure.
- Versatile chamber design accepts different types of packing, including V-ring, standard crown ring compression, and *Kevlar/PTFE square braid rope packing.
- Can be installed on API flanged trees using a Hercules companion flange.

* Kevlar is a trademark of E.I. du Pont de Nemours and Company.

High-Temperature Stuffing Box Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>HTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working pressure</td>
<td>3,000 psi</td>
</tr>
<tr>
<td>Bottom Thread</td>
<td>2, 2½, 3, 4-in.</td>
</tr>
<tr>
<td>Bottom connection</td>
<td>Male</td>
</tr>
<tr>
<td>Weight</td>
<td>2½ lb, 3½ lb, 2 lb, 1½ lb</td>
</tr>
<tr>
<td>Height (includes pin connection)</td>
<td>14 in.</td>
</tr>
<tr>
<td>Material</td>
<td>Body, base and cap: Alloy steel*</td>
</tr>
<tr>
<td></td>
<td>Lock nut: Carbon steel*</td>
</tr>
<tr>
<td></td>
<td>Split bushings: Bronze*</td>
</tr>
<tr>
<td>Rod sizes</td>
<td>1½, 1½, 1, ¾-in.</td>
</tr>
<tr>
<td>Packing OD</td>
<td>2½ in.</td>
</tr>
<tr>
<td>Stalk Height (primary or secondary)</td>
<td>2½ in.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Packing type</th>
<th>Maximum temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSN V-ring</td>
<td>320°F (160°C)</td>
</tr>
<tr>
<td>FKM V-ring</td>
<td>450°F (232°C)</td>
</tr>
<tr>
<td>Kevlar/PTFE</td>
<td>540°F (282°C)</td>
</tr>
</tbody>
</table>

High-Performance Lubricating Upper Gland (HPLUG)
- Provides a secondary seal for stuffing boxes.
- Allows installation of Hercules stuffing box leak detector or APA control device.
- Fits any Hercules classic model stuffing box.
- Zenk fitting for periodic greasing using ordinary NLGI-2 automotive chassis lubricant.
- NBR V-ring packing standard (optional: HSN or FKM V-ring; or braided Kevlar).
- Brass packing support rings are supplied with HSN, FKM, or Kevlar packing.
- Rod sizes: 1½, 1½, 1, ¾-in.
- Body and cap: ductile iron.
- Upper/lower packing rings, NBRs, or braided Kevlar (bronze optional).
- Saws same bolts as Hercules LUG.

High-Performance Lubricating Upper Gland (Big Stuff HPLUG)
- Required accessory for installation of Hercules stuffing box leak detector on all Big Stuff and Big Stuff DPSB models.
- Can also be used for installing Hercules APA control device on all Big Stuff and Big Stuff DPSB models (in place of Hercules SB leak detector).
- Provides a secondary seal for all Big Stuff and Big Stuff DPSB stuffing box models.
- Zenk fitting for periodic greasing.
- NBR V-ring packing standard (optional: HSN or FKM V-ring; or braided Kevlar).
- Brass packing support rings are supplied with HSN, FKM, or Kevlar packing.
- Rod sizes: 1½, 1½, 1, ¾-in.
- Body and cap meet NACE MR0175.
- Upper/lower packing support rings: MDS nylon (standard) or bronze (for high-temperature applications).
- Retrofitting existing Big Stuff models requires a special top follower.
- Can also be used with models equipped with Dome packing (requires special Big Stuff Dome APA-HPLUG top follower).
- ¾-in. NPT side port allows attachment of leak detector or APA control device.
- Uses same packing, packing support rings, and cap as PCSB.
Stuffing Box Accessories

Standard Oil Reservoir Gland (ORG)
- Designed for use on problem wells that pump or flow off
- Holds one quart of 30W motor oil (or other viscosity as necessary for extreme high- or low-temperature applications)
- ½-in. NPT port for installation of APA control device
- Note: Cannot be used with leak detector.
  - Top split cone wiper controls oil film on polished rod
  - Modified version available for Hercules IVSB, IVSBT, and IVSPSB models
  - Optional for all Hercules classic models
  - Rod sizes: 1, 1⅛, 1¼, 1½, 1¾ in.
  - Material: ductile iron
  - Standard ORG cap and drain nipple capture oil that escapes past loose or worn wiper cone
  - Lug gland cap option recommended to prevent water from prematurely shutting down well

High-Performance Oil Reservoir Gland (HPORG)
- Provides polished rod lubrication and extends packing life
- Wicks reduce oil consumption
- ½-in. NPT port for installation of APA control device
- Note: Cannot be used with leak detector.
  - Top split cone wiper controls oil film on polished rod
  - Optional for all Hercules classic models
  - Rod sizes: 1, 1⅛, 1¼, 1½, 1¾ in.
  - Material: ductile iron

Lubricating Upper Gland (LUG)
- Standard on classic models
- Zerk fitting for periodic greasing
- Top split cone wiper controls oil film on polished rod
- Extends packing life and reduces maintenance costs
- Rod sizes: 1, 1⅛, 1¼, 1½, 1¾ in.
- Material: ductile iron

Leak Detector
- Adapts to all Hercules classic stuffing boxes and Hercules Big Stuff stuffing boxes equipped with HPUG
- Consists of the following:
  - Pressure-activated shutdown switch
    - Meets NEC Class 1, Div. 1 requirements
  - Provides positive shutdown of the flow
  - Easily wired to SCADA or a controller
  - Manifold connection
    - Two ½-in. ports and one ¼-in. port allow custom installation
  - ½-in. end cap allows easy clean-out of blockage
  - HPUG required for installation (not included; must purchase separately)
    - Set at 28 psi as standard
    - Available in 1,500, 2,500, and 3,000 psi

Anti-Pollution Adapter (APA) Control Device
- The original Hercules leak detection system used to prevent costly stuffing box spills; used worldwide since 1975
- Converts Hercules ORG to APA
- Can also be used with HPORG or HPUG
- Double-stainless-steel container
- Meets NEC Class 1, Div. 1 (both explosion-proof switch)
- Switch options: Standard or explosion-proof with NEC Class 1, Div. 1, UL, FM, CSA approvals, and CE conformance mark
- Approximately 1½ capacity

Pollution- Control Adapter
- Compatible with any Hercules DPSB
- Can be retrofitted on existing double-packed stuffing box
- Comprehensive spill protection from polished rod breaks
- Suitable for cold weather service, -50°F (-45.5°C)
- Meets NACE MR0175
- ½-in. NPT test port
- Base options:
  - 2-in. EUE Male
  - 2½-in. EUE Male
  - 3-in. 8V LP Male
  - 3-in. EUE Male
  - 2½-in. 2,000 psi API Flange
  - 2-in. 2,000 psi API Flange
  - 3-in. 2,000 psi API Flange
  - 3-in. 5,000 psi API Flange

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artificialift@nov.com
nov.com/artificialift
Stuffing Box Packing

We offer a broad range of sizes, materials, and designs to best fit your stuffing box configuration. Our Hercules packing is compatible with various models of stuffing boxes. Whether you have a mild or extreme application, our various packing compounds will match your well conditions.

Dome Packing
- Rod sizes: 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, or 1 3/4 in.
- Dramatically reduces stuffing box failures and maintenance costs
- Rubber packing with unique PTFE seal ring
- PTFE seal ring minimizes contact between rubber and polished rod
- Low coefficient of friction
- Less heat buildup
- Lower drag on polished rod
- Unique bowl shape converts vertical compression forces into radial forces for a tight seal around polished rod
- Automatically compensates for changes in flowline pressure
- One-time conversion kit to retrofit most cone-packed stuffing boxes
- Designed for easy replacement using packing pullers (available from National Oilwell Varco—P/N 9755614)
- U.S. patent number: 5623371

Sure-Pak™ Packing
- Soft+ handles temperatures to 160°F (71°C)
- Pressure-handling capabilities to 2,500 psi
- Rubber packing with unique PTFE seal ring
- Effectively dissipates heat
- Enhances fluid sealing control
- Longer packing service life
- Fewer packing gland adjustments required
- U.S. patent number: 5845909

Dome Packing
- Rod sizes: 1⅛, 1¼, 1 5⁄16, 1⅜, 1½, or 1¾ in.
- Dramatically reduces stuffing box failures and maintenance costs
- Rubber packing with unique PTFE seal ring
- PTFE seal ring minimizes contact between rubber and polished rod
- Low coefficient of friction
- Less heat buildup
- Lower drag on polished rod
- Unique bowl shape converts vertical compression forces into radial forces for a tight seal around polished rod
- Automatically compensates for changes in flowline pressure
- One-time conversion kit to retrofit most cone-packed stuffing boxes
- Designed for easy replacement using packing pullers (available from National Oilwell Varco—P/N 9755614)
- U.S. patent number: 5623371

H₂S and Conversion CO₂ Table

<table>
<thead>
<tr>
<th>PPM</th>
<th>% H₂S</th>
<th>% CO₂</th>
<th>Maximum temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000 PPM</td>
<td>0.1%</td>
<td>Not recommended</td>
<td>265°F (129°C)</td>
</tr>
<tr>
<td>2,000 PPM</td>
<td>0.2%</td>
<td>Not recommended</td>
<td>325°F (163°C)</td>
</tr>
<tr>
<td>3,000 PPM</td>
<td>0.5%</td>
<td>Not recommended</td>
<td>450°F (232°C)</td>
</tr>
<tr>
<td>10,000 PPM</td>
<td>1.0%</td>
<td>Not recommended</td>
<td>650°F (343°C)</td>
</tr>
<tr>
<td>50,000 PPM</td>
<td>5.0%</td>
<td>Not recommended</td>
<td>1,200°F (648°C)</td>
</tr>
</tbody>
</table>

Packing Material Table

<table>
<thead>
<tr>
<th>Material</th>
<th>Maximum % H₂S</th>
<th>Maximum % CO₂</th>
<th>Maximum temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBR Dome</td>
<td>2%</td>
<td>Not recommended</td>
<td>265°F (129°C)</td>
</tr>
<tr>
<td>HNBR Dome</td>
<td>3%</td>
<td>20%</td>
<td>325°F (163°C)</td>
</tr>
<tr>
<td>EPDM Mincord</td>
<td>1%</td>
<td>1%</td>
<td>450°F (232°C)</td>
</tr>
<tr>
<td>Sure-Pak Soft</td>
<td>2%</td>
<td>Not recommended</td>
<td>650°F (343°C)</td>
</tr>
<tr>
<td>Sure-Pak “G”</td>
<td>1%</td>
<td>20%</td>
<td>650°F (343°C)</td>
</tr>
</tbody>
</table>
Stuffing Box Packing

**Dome Packing Configurations**

- Lightening ring
- Blotch holes in packing stem
- Blind holes for forming guide pins
- ¾ in. - 20 NC "pullout threads"
- Split bronze ring
- Rubber compound

**Selection Criteria for Rubber Compounds in Stuffing Boxes and BOPs**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Maximum service temperature with concentrations of H₂S and CO₂ below 1%</th>
<th>Maximum service temperature with concentrations of H₂S and CO₂ at maximum tolerance levels</th>
<th>Maximum tolerances for H₂S</th>
<th>Resistance to explosive decompression in CO₂ concentrations up to 25%</th>
<th>Performance in steam environments</th>
<th>Mechanical tear and abrasive resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>ASTM Type</td>
<td>°F</td>
<td>°C</td>
<td>°F</td>
<td>°C</td>
<td>% H₂S</td>
</tr>
<tr>
<td></td>
<td>Soft, Hard, Special lubricated, Heavy-duty, PTFE Filled, Hercules gold</td>
<td>SBR</td>
<td>180</td>
<td>71</td>
<td>160</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>Compound C</td>
<td>NBR</td>
<td>360</td>
<td>149</td>
<td>250</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>Compound D</td>
<td>NBR</td>
<td>325</td>
<td>163</td>
<td>300</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>Compound G</td>
<td>ETR/M</td>
<td>425</td>
<td>218</td>
<td>350</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>Compound ST</td>
<td>SBR</td>
<td>180</td>
<td>71</td>
<td>160</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>Herculex</td>
<td>NBR</td>
<td>250</td>
<td>121</td>
<td>150</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Slick Pack™</td>
<td>NBR</td>
<td>325</td>
<td>163</td>
<td>300</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>*Max Dome</td>
<td>TFE/F</td>
<td>450</td>
<td>230</td>
<td>250</td>
<td>177</td>
</tr>
</tbody>
</table>

Note: Above temperatures are suggested "Maximum short-term" ratings and should not be considered as a "Continuous operating temperature."

- SBR: Styrene butadiene rubber
- NBR: Nitrile rubber
- HNBR: Highly saturated nitrile or hydrogenated nitrile
- EPDM: Ethylene propylene
- Filled: Contains black filler
- Compound ST: Slick Pack™ with Teflon flakes

**Cone and V-ring Packing**

The most important feature of stuffing box packing is long-lasting performance. NOV continually tests new and better materials to meet the demands for ever-changing well conditions. Extensive field tests make certain new packing stands up to stringent durability and performance standards. Cone packing is available in sizes for all polished rods 1 through 1¾ in. in sets of four (three top cones and one bottom cone) and five (four top cones and one bottom cone).

**Cone Packing**

- **Herculex**
  - For sweet crudes with high oil-to-water ratios and low sand content
- **Soft cone packing**
  - For sweet crudes with high oil-to-water ratios and low sand content
- **Hard cone packing**
  - For sweet crudes with high oil-to-water ratios
- **Slack Pack™ (Compound ST)**
  - For reducing polished rod noise "squeaking" in noise-sensitive locations on crudes with high oil-to-water ratios and low sand content
- **Special lubricated**
  - For sweet crudes with high oil-to-water ratios and low sand content
- **Heavy-duty**
  - For prolonged service on sweet crudes and wells without constant flow
- **PTFE Filled**
  - For sweet crudes and wells with long stroke and fast pumping cycles
- **Compound C**
  - For steam injection wells producing sweet crudes
- **Compound D**
  - For steam injection wells producing sweet crudes
- **Compound H**
  - For steam injection wells
- **Compound S™**
  - For sweet crudes with high oil-to-water ratios and low sand content

**V-ring packing**

- **Herculex**
  - For steam injection wells producing sweet crudes
- **Soft**
  - For steam injection wells producing sweet crudes
- **Hard**
  - For steam injection wells producing sweet crudes
- **Compound ST**
  - For steam injection wells producing sweet crudes
- **Compound S™**
  - For steam injection wells producing sweet crudes
- **Compound D**
  - For steam injection wells producing sweet crudes

**Other Packing**

- **Compound S™**
  - For steam injection wells producing sweet crudes
- **Compound D**
  - For steam injection wells producing sweet crudes
- **Herculex**
  - For steam injection wells producing sweet crudes

Note: The guidelines on this page are for general reference purposes only and should not be used as the sole determining factor for packing material selection. Each downhole condition is different and must be addressed on a case-by-case basis to determine the best material solution for each particular well.
Blowout Preventers

We provide an extensive offering of blowout preventers for well control and monitoring. Our various designs of BOPs can handle a wide range of pressures and extreme applications.

150H Single Ram BOP
- Caps have hammer lugs and ACME threads for fast removal and replacement (ACME threads eliminate cross-threading).
- Cap with internal threads protected from the environment.
- Lugless cap option for installation on API flanged bonnets.
- Blowout-proof ram screw.
- Full opening.
- Reinforced ram block reduces extrusion.
- Cap O-ring provides reliable, pressure-tight seal.

150H and 200P BOP Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>150H</th>
<th>200P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size available</td>
<td>2 in.</td>
<td>2 in.</td>
</tr>
<tr>
<td>Vertical bore</td>
<td>1.975 in.</td>
<td>2.560 in.</td>
</tr>
<tr>
<td>Working pressure</td>
<td>1,500 psi</td>
<td>2,000 psi</td>
</tr>
<tr>
<td>Body and cap material</td>
<td>Ductile iron*</td>
<td>Ductile iron*</td>
</tr>
<tr>
<td>Ram material and packing gland</td>
<td>Carbon steel**</td>
<td>Alloy steel</td>
</tr>
<tr>
<td>Ram sizes</td>
<td>Blind, ⅝, 1, 1⅛, 1¼, 1½, 1¾ in.</td>
<td>Blind, ⅝, 1, 1⅛, 1¼, 1½, 1¾ in.</td>
</tr>
<tr>
<td>Ram screw packing</td>
<td>Acrylic braided PTFE</td>
<td>NBR, HSN, and FKM</td>
</tr>
<tr>
<td>Connection</td>
<td>Male x female thread</td>
<td>Male x female thread or flange</td>
</tr>
<tr>
<td>Optional flange connections</td>
<td>N/A</td>
<td>2½-in. 2,000, 2¾-in. 2,000, 3⅛-in. 2,000***</td>
</tr>
<tr>
<td>Weight</td>
<td>43 lb</td>
<td>52 lb</td>
</tr>
<tr>
<td>Width (rams open)</td>
<td>20 in.</td>
<td>26 in.</td>
</tr>
<tr>
<td>Handles</td>
<td>Optional</td>
<td>Optional</td>
</tr>
</tbody>
</table>

Note: 150H and 200P rams are not interchangeable. Also, they are “directional” due to the internal reinforcement plate. Always install with “THIS SIDE UP” sticker facing up.

150H and 200P Ram Materials

<table>
<thead>
<tr>
<th>Material</th>
<th>NBR</th>
<th>HNBR</th>
<th>FKM</th>
<th>AFLAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working temperature</td>
<td>150°F (65°C)</td>
<td>150°F (65°C)</td>
<td>150°F (65°C)</td>
<td>150°F (65°C)</td>
</tr>
<tr>
<td>Maximum S</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Maximum CO₂</td>
<td>N/A</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Always install with yellow “THIS SIDE UP” lettering facing up to minimize extrusion under pressure.

Note: Above temperatures are suggested/minimum shock ratings and should not be considered as a “Continuous operating temperature.”
Blowout Preventers

3K Single Ram BOP
- 3,000-psi MWP
- Connections: 2 1/2, 3, and 3 5/8 in. EUE female x male (standard)
- Rams: Blind, 3", 1½ in.
- Standard models: NACE-compliant
- All-steel construction eliminates risk of casting porosity
- 1/4-in. NPT ports above and below rams for bleeding pressure

3K Single Ram ITBOP (Integral Tee BOP)
- 3,000-psi MWP
- Standard models: NACE-compliant
- Integral flow tee reduces stack height
- Connections: 3", 7 1/16", and 11 in. (see spec table)
- Rams: Blind, 3", 1½ in.
- Integral tee outlets are 2 or 3 in.
- All-steel construction eliminates risk of casting porosity

5K Single Ram BOP
- 5,000-psi MWP
- Standard models: NACE-compliant
- Connections: 2 1/2", 5,000 API bottom x top
- Rams: Blind, 1¼", 1½ in.
- All-steel construction eliminates risk of casting porosity

5K Single Ram ITBOP (Integral Tee BOP)
- 5,000-psi MWP
- Standard models: NACE-compliant
- Integral flow tee reduces stack height
- Connections: 2 1/2", 5,000 API bottom x top
- Rams: Blind, 1¼", 1½ in.
- All-steel construction eliminates risk of casting porosity

10K Dual Ram ITBOP
- 10,000-psi MWP
- Standard models: NACE-compliant
- Integral flow tee reduces stack height
- Connections: 2 5/8 in. 10,000 API bottom x studded top
- Rams: Blind, 1¼", 1½ in.
- All-steel construction eliminates risk of casting porosity

Blowout Preventer Specifications

3K Single BOP and 3K Single ITBOP

<table>
<thead>
<tr>
<th>Specifications</th>
<th>3K BOP</th>
<th>3K Single ITBOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top connections</td>
<td>2½ in. EUE</td>
<td>2½ in. 3K API flanged</td>
</tr>
<tr>
<td>Bottom connections</td>
<td>2½ in. EUE</td>
<td>2½ in. 3K API flanged</td>
</tr>
<tr>
<td>Vertical bore</td>
<td>2.56 in.</td>
<td>2.56 in.</td>
</tr>
<tr>
<td>Working pressure</td>
<td>3,000 psi</td>
<td>3,000 psi</td>
</tr>
<tr>
<td>Body and cap material</td>
<td>Alloy steel</td>
<td>Alloy steel</td>
</tr>
<tr>
<td>Ram material</td>
<td>Alloy steel</td>
<td>Alloy steel</td>
</tr>
<tr>
<td>Ram screw and packing gland</td>
<td>Alloy steel</td>
<td>Alloy steel</td>
</tr>
<tr>
<td>Ram size options</td>
<td>Blind, 1¼ in. and 1½ in.</td>
<td>Blind, 1¼ in. and 1½ in.</td>
</tr>
<tr>
<td>Ram screw packing ring</td>
<td>HSN (HNBR)</td>
<td>HSN (HNBR)</td>
</tr>
<tr>
<td>Side outlet connections</td>
<td>N/A</td>
<td>2–x 3½-in. Velp or 2–x 2½-in. LP</td>
</tr>
<tr>
<td>Height</td>
<td>15.88 in.</td>
<td>15.88 in.</td>
</tr>
<tr>
<td>Weight</td>
<td>600 lb</td>
<td>600 lb</td>
</tr>
<tr>
<td>90-deg (Rams open/closed)</td>
<td>25.53/37.65 lb</td>
<td>24.76/20.64 lb</td>
</tr>
</tbody>
</table>

Note: Rams are shown closed. Rams cannot be removed and turned upside down to change top x bottom connection orientation.

5K Single, 5K Dual ITBOP, and 10K Dual ITBOP

<table>
<thead>
<tr>
<th>Specifications</th>
<th>5K Single BOP</th>
<th>5K Dual ITBOP</th>
<th>10K Dual ITBOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top connections</td>
<td>2 5/8 in. 5K API studded</td>
<td>2 5/8 in. 10K API studded</td>
<td></td>
</tr>
<tr>
<td>Bottom connections</td>
<td>2 5/8 in. 5K API flanged</td>
<td>2 5/8 in. 10K API flanged</td>
<td></td>
</tr>
<tr>
<td>Vertical bore</td>
<td>2.97 in.</td>
<td>2.97 in.</td>
<td></td>
</tr>
<tr>
<td>Working pressure</td>
<td>5,000 psi</td>
<td>10,000 psi</td>
<td></td>
</tr>
<tr>
<td>Body and cap material</td>
<td>Alloy steel</td>
<td>Alloy steel</td>
<td></td>
</tr>
<tr>
<td>Ram material</td>
<td>Alloy steel</td>
<td>Alloy steel</td>
<td></td>
</tr>
<tr>
<td>Ram screw and packing gland</td>
<td>Alloy steel</td>
<td>Alloy steel</td>
<td></td>
</tr>
<tr>
<td>Ram size options</td>
<td>Blind, 1¼ in. and 1½ in.</td>
<td>Blind, 1¼ in. and 1½ in.</td>
<td></td>
</tr>
<tr>
<td>Ram screw packing ring</td>
<td>HSN (HNBR)</td>
<td>HSN (HNBR)</td>
<td></td>
</tr>
<tr>
<td>Side outlet connections</td>
<td>N/A</td>
<td>2-in. LP (standard) or optional 21/16 in. 5K API studded</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>15.88 in.</td>
<td>18 in.</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>334 lb</td>
<td>334 lb</td>
<td></td>
</tr>
<tr>
<td>Width (Rams open/closed)</td>
<td>23.45/20.64 in.</td>
<td>23.45/20.64 in.</td>
<td></td>
</tr>
</tbody>
</table>

Note: Rams are shown closed. Rams cannot be removed and turned upside down to change top x bottom connection orientation.

3K, 5K, and 10K Ram Materials

<table>
<thead>
<tr>
<th>Ram material</th>
<th>AISI 4130</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ram seal</td>
<td>HSN</td>
</tr>
<tr>
<td>Minimum temperature</td>
<td>20°F (−6°C)</td>
</tr>
<tr>
<td>Maximum H2S</td>
<td>10%</td>
</tr>
<tr>
<td>Maximum CO2</td>
<td>20%</td>
</tr>
</tbody>
</table>

Note: Tmax temperatures are suggested maximum short-term operating condition and should not be considered as a “Continuous operating temperature.”
Polished Rod Accessories

We manufacture Hercules polished rod accessories to assist with maintenance and prolong the life of your polished rod. Throughout years of field-proven experience, our products have been engineered to meet your quality expectations.

Caution: All models can only be used on piston steel polished rods. Rod clamps are not capable of gripping the spray-metal section of “hard-faced” or “hard-coated” polished rods. Installation of rod clamps on the spray-metal portion of a hard-faced/polished rod can crack the hard coating.

Caution: All models are only be used on piston steel polished rods. Rod clamps are not capable of gripping the spray-metal section of “hard-face” or “hard coated” polished rods. Installation of rod clamps on the spray-metal portion of a hard faced/polished rod can crack the hard coating.

Polished Rod Clamps

Figure Clamps

- Indention style
- Rugged, yet light and easy to handle
- Lower stress concentrations in polished rod
- Highest clamping capacity at any bolt torque
- Independent clamping segments on a common hinge
- Bolts have to be tightened only once
- Ends are precision machined perpendicular to axis of polished rod
- Streamlined design
- Small rotating diameter for use with rod rotators
- Zinc phosphate coating for better corrosion resistance
- Most economical design in the industry

Rod Boss and Rod Boss Jr. clamps

- Friction style–Rod Boss
- Indention style–Rod Boss Jr.
- Zinc phosphate coating for better corrosion resistance

Polished Rod Clamps

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Figure Clamp 1</th>
<th>Figure Clamp 2</th>
<th>Figure Clamp 3</th>
<th>Rod Boss</th>
<th>Rod Boss Jr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated load</td>
<td>13,000 lb</td>
<td>26,000 lb</td>
<td>40,000 lb</td>
<td>40,000 lb</td>
<td>25,000 lb</td>
</tr>
<tr>
<td>Maximum test load</td>
<td>32,000 lb</td>
<td>64,000 lb</td>
<td>76,000 lb</td>
<td>55,000 lb</td>
<td>35,000 lb</td>
</tr>
<tr>
<td>Polished rod size</td>
<td>1, 1⅛, 1¼, 1⅜, 1½ in.</td>
<td>1, 1⅛, 1¼, 1⅜, 1½ in.</td>
<td>1, 1⅛, 1¼, 1⅜, 1½ in.</td>
<td>1⅜ or 1½ in. (1⅜ in not available)</td>
<td>1⅛, 1⅛, 1¼, 1½ in.</td>
</tr>
<tr>
<td>Recommended maximum bolt torque</td>
<td>250 ft-lb</td>
<td>250 ft-lb</td>
<td>250 ft-lb</td>
<td>550 ft-lb</td>
<td>250 ft-lb</td>
</tr>
<tr>
<td>Weight</td>
<td>3½ lb</td>
<td>7½ lb</td>
<td>11¼ lb</td>
<td>25 lb</td>
<td>10⅓ lb</td>
</tr>
<tr>
<td>Height</td>
<td>2½ in</td>
<td>5 in</td>
<td>7½ in</td>
<td>6½ in</td>
<td>9⅜ in</td>
</tr>
<tr>
<td>Rotating diameter</td>
<td>5⅜ in</td>
<td>5⅜ in</td>
<td>5⅜ in</td>
<td>9⅜ in</td>
<td>9⅜ in</td>
</tr>
<tr>
<td>Body material</td>
<td>Forged steel</td>
<td>Forged steel</td>
<td>Forged steel</td>
<td>Forged steel</td>
<td>Forged steel</td>
</tr>
<tr>
<td>Nut hex size</td>
<td>1⅛ in</td>
<td>1⅛ in</td>
<td>1⅛ in</td>
<td>1⅛ in</td>
<td>1⅛ in</td>
</tr>
</tbody>
</table>

Caution: Do not exceed the bolt torque values specified above; otherwise, galling of bolt threads may occur.

artificiallift@nov.com  nov.com/artificiallift
Polished Rod Accessories

Leveling Plate
- Minimizes polished rod breaks
- Compensates for carrier bar misalignment up to 2°
- Installed under rod rotator, or under polished rod clamp if rotators are not used
- Available for all polished rod sizes
- Ensures uniform engagement between polished rod clamp and carrier bar
Note: Mating convex and concave surfaces should be lubricated with grease prior to installation.

Polished Rod Support
- Prevents crushing of packing by transferring rod load to stuffing box body
- Designed for use with Hercules SB, SBT, and DPSB stuffing boxes equipped with standard LUG
- Constructed of lightweight, high-strength aluminum alloy
- Weight: 25 lb
- Maximum load: 50,000 lb

Lubricator
- Provides convenient polished rod lubrication
- Easy installation—use with any style of stuffing box
- Lubrication extends stuffing box packing life
- Uses one quart of ordinary motor oil
- Uses replaceable felt wicks (specify rod size when ordering)
- Available for all polished rod sizes
- 5½-in. height

stuffing Box Clamp
- Assists operator in safely changing out primary packing in double-packed stuffing box
- Holds top portion of stuffing box on the polished rod to allow access to the primary packing
- Can be used on polished rod sizes from 1⅜ to 1¾ in.

Hercules Bullet
- Used to assist in the installation of a polished rod through a stuffing box
- Reduces risk of damaging polished rod threads, stuffing box packing, and flapper valve on PCSB stuffing boxes
- Includes cross-hole to assist removal from polished rod
- Available part numbers and sizes:
  - 1000B—1.5 x 1-in. bullet
  - 875B—1.5 x ¾-in. bullet
  - 100036—1.25 x ¾-in. bullet

Rod Rotators
Rod rotation is the most effective means of removing paraffin from inside the tubing and distributing wear evenly. Our Hercules rod rotators are field-proven leaders in the industry.
Rod Rotators

<table>
<thead>
<tr>
<th>Specifications</th>
<th>T-164</th>
<th>T-164SG</th>
<th>T-252</th>
<th>T-253</th>
<th>T-302</th>
<th>T-302SG</th>
<th>T303^</th>
<th>T303SG^</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max output torque</td>
<td>106 ft-lb</td>
<td>106 ft-lb</td>
<td>120 ft-lb</td>
<td>280 ft-lb</td>
<td>240 ft-lb</td>
<td>240 ft-lb</td>
<td>240 ft-lb</td>
<td>240 ft-lb</td>
</tr>
<tr>
<td>Max recommended load</td>
<td>12,000 lb</td>
<td>12,000 lb</td>
<td>12,000 lb</td>
<td>22,000 lb</td>
<td>18,000 lb</td>
<td>18,000 lb</td>
<td>24,000 lb</td>
<td>24,000 lb</td>
</tr>
<tr>
<td>Required opening between bridle lines</td>
<td>4 in.</td>
<td>4 in.</td>
<td>6 in.</td>
<td>6 in.</td>
<td>7 in.</td>
<td>7 in.</td>
<td>7 in.</td>
<td>7 in.</td>
</tr>
<tr>
<td>Finished rotators</td>
<td>3½ to 11½ in.</td>
<td>3½ to 11½ in.</td>
<td>3½ to 11½ in.</td>
<td>3½ to 11½ in.</td>
<td>3½ to 11½ in.</td>
<td>3½ to 11½ in.</td>
<td>3½ to 11½ in.</td>
<td>3½ to 11½ in.</td>
</tr>
<tr>
<td>Shipping weight</td>
<td>4½ lb</td>
<td>4½ lb</td>
<td>5½ lb</td>
<td>5½ lb</td>
<td>6½ lb</td>
<td>6½ lb</td>
<td>6½ lb</td>
<td>6½ lb</td>
</tr>
<tr>
<td>Height</td>
<td>4¼ in.</td>
<td>4¼ in.</td>
<td>5½ in.</td>
<td>5½ in.</td>
<td>6½ in.</td>
<td>6½ in.</td>
<td>6½ in.</td>
<td>6½ in.</td>
</tr>
<tr>
<td>Rotation type</td>
<td>Helical gear</td>
<td>Helical gear</td>
<td>Helical gear</td>
<td>Helical gear</td>
<td>Helical gear</td>
<td>Helical gear</td>
<td>Helical gear</td>
<td>Helical gear</td>
</tr>
<tr>
<td>Body material</td>
<td>Ductile iron</td>
<td>Ductile iron</td>
<td>Ductile iron</td>
<td>Ductile iron</td>
<td>Ductile iron</td>
<td>Ductile iron</td>
<td>Ductile iron</td>
<td>Ductile iron</td>
</tr>
<tr>
<td>Actuator cable length*</td>
<td>16 ft</td>
<td>16 ft</td>
<td>16 ft</td>
<td>16 ft</td>
<td>25 ft</td>
<td>25 ft</td>
<td>25 ft</td>
<td>25 ft</td>
</tr>
<tr>
<td>90° lever pulls per revolution</td>
<td>28</td>
<td>28</td>
<td>35</td>
<td>35</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>77</td>
</tr>
<tr>
<td>Actuator type</td>
<td>Ratchet</td>
<td>Ratchet</td>
<td>Ratchet</td>
<td>Ratchet</td>
<td>Clutch</td>
<td>Clutch</td>
<td>Clutch</td>
<td>Clutch</td>
</tr>
</tbody>
</table>

* Cable lengths available upon request: 10, 16, and 25 in.
Note: Rotators must be under load to operate (except for no-slip models). "Bench testing" severely affects reliability and is not recommended.

Tubing Rotators

We have been providing effective tubing wear solutions for over 70 years. Whether using rod pumping units or progressing cavity downhole pumps, we offer the most complete package of wear prevention solutions, including tubing rotators. Our RODEC™ tubing rotators and swivels cover a wide range of products designed to effectively distribute wear evenly around the entire internal circumference of the production tubing. The application of these products can dramatically increase tubing life span and reduce operating costs proportionately.
**RODEC “C” Low-Profile Rotator/RODEC “C” Integral Rotator (3 in 1)**

Field-proven with years of effective service performance, the RODEC “C” models significantly decrease production costs per barrel. The RODEC “C” tubing rotators’ patented technology radically slows tubing wear resulting in savings of service rig costs and downtime. The compact design allows for easy installation on any existing well or new completion.

- Uses separate rotating hanger that sits in the customer tubing head. Hanger and rotator are coupled through a spline connection.
- Split rotating hanger option (J-slot) for setting tubing in tension is available.
- Rotating elements and mechanism are isolated from the wellbore, annular fluid, and gases, preventing corrosion damage.
- Overall height for the RODEC “C” low-profile rotator is 5 in., while the RODEC “C” integral rotator is about 12 in.

**RODEC RII Tubing Rotator**

Featuring a modular design, the RODEC RII tubing rotator is the most versatile unit in the market due to its ability to adapt to flanged and threaded cap wellheads. The main body or spool is the same for all configurations having a wide variety of top and bottom connections.

Depending on customer needs, the following tubing hanger options are available:

- Tubing string hung directly from the tubing rotator inner mandrel (separate hanger not required)
- Tubing string hung from a double-box bushing that connects to the tubing rotator (separate hanger not required)
- Tubing string hung from a rotating hanger landed in the tubing head body; this option incorporates a J-slot connection enabling for landing an anchor catcher and setting the tubing string in tension
- Low-profile design
- Compatible with a wide range of wellhead configurations (either threaded cap style or flanged)
- Top-end connections can be either API male threads, stud-thru flanges, or ITBOP

**Top Connection**

- ITBOP on top (standard/swivelling)
- Pin-up top connection
- Flanged top connection

**Body + Wellhead Connection**

- Threaded Cap Wellhead Connection
- Tubing string hung from tubing rotator gear mandrel
- Tubing string hung from split rotating hanger double-box bushing
- Tubing string hung from split rotating hanger landed on customer wellhead
- Tubing string hung from split rotating hanger landed on customer wellhead
- Tubing string hung from split rotating hanger double-box bushing

- Flanged Wellhead Connection
- Tubing string hung from tubing rotator gear mandrel
- Tubing string hung from split rotating hanger landed on customer wellhead
- Tubing string hung from split rotating hanger landed on customer wellhead
- Tubing string hung from split rotating hanger double-box bushing

artificiallift@nov.com
RODEC High-Temperature Tubing Rotator

Capable of operating in temperatures up to 650°F (343°C) and pressures up to 3,000 psi, the RODEC high-temperature tubing rotator can be installed on any wellhead configuration that complies with API specifications. In addition, it can rotate any size of production tubing with an API thread connection.

The RODEC high-temperature tubing rotator has a patented, self-energized sealing mechanism that does not require service or adjustment.

- Low-profile design
- Does not require a separate tubing hanger

RODEC Ultimate Tubing Rotator

By only adding 9 to 12½ in. of height to the wellhead, the RODEC Ultimate tubing rotator is one of the most compact rotators in the market. As a fixed component of the wellhead, it remains in place during well servicing, having the BOP installed on top. The unit acts as a tubing head, complete with lockdown screws. It is studded down to fit any existing API tubing head and flanged up to rigidly support other components. The tubing hanger is landed in the tubing rotator spool and replaces the need for a conventional tubing hanger.

- Retools any well with an existing tubing head
- Compatible with rotating and reciprocating applications
- Minimum maintenance and field repairable

RODEC Dual String Hanger and Tubing Rotator

Including a side-entry access for chemical injection or coiled tubing jobs, the RODEC dual-string hanger and tubing rotator is a powerful solution for complex applications. Two tubing strings can be independently hung from the custom-built spool furnished with lockdown screws, but only the production tubing is rotated.

- Separate connections for hanging each tubing string
- Secondary hold-down mechanism included for the production tubing hanger
- ITBOP included

---

**Tubing Rotator Specifications**

<table>
<thead>
<tr>
<th></th>
<th>III</th>
<th>C low-profile</th>
<th>C integral</th>
<th>Ultimate</th>
<th>Dual string hanger</th>
<th>High temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wellhead connection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flange</td>
<td>7/8 in.</td>
<td>9 in.</td>
<td>7/8 in.</td>
<td>9 in.</td>
<td>7/8 in.</td>
<td>9 in.</td>
</tr>
<tr>
<td><em>Threaded cap</em></td>
<td>7½ in.</td>
<td>8 in.</td>
<td>7½ in.</td>
<td>8 in.</td>
<td>7½ in.</td>
<td>8 in.</td>
</tr>
<tr>
<td><strong>Pressure rating</strong></td>
<td>2,000 psi</td>
<td>3,000 psi</td>
<td>2,000 psi</td>
<td>3,000 psi</td>
<td>2,000 psi</td>
<td>3,000 psi</td>
</tr>
<tr>
<td>Flange</td>
<td>3½ in.</td>
<td>4 in.</td>
<td>3½ in.</td>
<td>4 in.</td>
<td>3½ in.</td>
<td>4 in.</td>
</tr>
<tr>
<td>Top connection</td>
<td>3 in. EUE</td>
<td>4 in.</td>
<td>3 in. EUE</td>
<td>4 in.</td>
<td>3 in. EUE</td>
<td>4 in.</td>
</tr>
<tr>
<td>Thread</td>
<td>2½ in. EUE</td>
<td>3½ in. EUE</td>
<td>2½ in. EUE</td>
<td>3½ in. EUE</td>
<td>2½ in. EUE</td>
<td>3½ in. EUE</td>
</tr>
<tr>
<td>ITBOP</td>
<td>3½ in. EUE</td>
<td>4 in. EUE</td>
<td>3½ in. EUE</td>
<td>4 in. EUE</td>
<td>3½ in. EUE</td>
<td>4 in. EUE</td>
</tr>
<tr>
<td><strong>Tubing sizes</strong></td>
<td>2½ in. EUE</td>
<td>3½ in. EUE</td>
<td>4½ in. NUE</td>
<td>5½ in. CSG</td>
<td>2½ in. EUE</td>
<td>3½ in. EUE</td>
</tr>
<tr>
<td><strong>Torque rating</strong></td>
<td>2,400 ft-lbf</td>
<td>2,200 ft-lbf</td>
<td>2,200 ft-lbf</td>
<td>2,200 ft-lbf</td>
<td>2,200 ft-lbf</td>
<td>2,200 ft-lbf</td>
</tr>
<tr>
<td><strong>Pressure rating</strong></td>
<td>3,000 psi</td>
<td>5,000 psi</td>
<td>3,000 psi</td>
<td>5,000 psi</td>
<td>3,000 psi</td>
<td>5,000 psi</td>
</tr>
<tr>
<td><strong>Temperature rating</strong></td>
<td>125°F (52°C)</td>
<td>220°F (104°C)</td>
<td>300°F (149°C)</td>
<td>500°F (260°C)</td>
<td>600°F (315°C)</td>
<td>667°F (353°C)</td>
</tr>
<tr>
<td><strong>Thrust-bearing load rating</strong></td>
<td>50,000 lbf (standard)</td>
<td>125,000 lbf (heavy-duty)</td>
<td>125,000 lbf (custom)</td>
<td>60,000 lbf (standard)</td>
<td>125,000 lbf (HD)</td>
<td>60,000 lbf (standard)</td>
</tr>
<tr>
<td><strong>Drive system</strong></td>
<td>Manual BPU</td>
<td>Electric motor</td>
<td>12 volt</td>
<td>110 volt</td>
<td>240/460 volt</td>
<td>12 volt</td>
</tr>
</tbody>
</table>

*Standard seals are highly saturated nitrile (HSN)
**Tubing and Anchor Catch Swivels**

**RODEC Slimline Tubing Swivel**

Engineered to meet demanding applications requiring a tubing swivel, the RODEC downhole tubing swivel allows for installing and removing mechanically set tools. Working in conjunction with a RODEC tubing rotator, it enables the tubing string to be rotated during production while keeping the downhole pump anchored.

- Mechanical clockwise rotation setting/counter-clockwise rotation unsetting
- Reduced outside diameter
- Redundant seals to protect against wellbore fluids
- Extended length on the pin thread for applying power tongs

**RODEC Anchor Catcher Swivel**

The RODEC anchor catcher swivel has been engineered to be used in conjunction with a right-hand set anchor catcher in applications where the production tubing is installed in tension. The AC swivel allows for mechanically setting the anchor in a clockwise direction upon installation, the tubing can then be pulled into tension and rotated during production.

- Mechanical clockwise rotation setting/counter-clockwise rotation unsetting
- Redundant seals to protect against wellbore fluids

### Downhole Tubing Swivel Specifications

<table>
<thead>
<tr>
<th></th>
<th>Slimline</th>
<th>Anchor Catcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connections</td>
<td>2 1/8 in. EUE</td>
<td>2 1/8 in. EUE</td>
</tr>
<tr>
<td>Pressure rating</td>
<td>6,000 psi</td>
<td>6,000 psi</td>
</tr>
<tr>
<td>Dimensions</td>
<td>3.84 in. (97.54 mm)</td>
<td>3.84 in. (97.54 mm)</td>
</tr>
<tr>
<td>Drill</td>
<td>2.38 in. (60.33 mm)</td>
<td>2.38 in. (60.33 mm)</td>
</tr>
<tr>
<td>Overall length</td>
<td>23.3 in. (593 mm)</td>
<td>27.8 in. (706 mm)</td>
</tr>
<tr>
<td>Shear torque (shear pins)**</td>
<td>576 ft-lbf</td>
<td>576 ft-lbf</td>
</tr>
<tr>
<td>Continuous torque rating</td>
<td>2,000 ft-lbf</td>
<td>2,000 ft-lbf</td>
</tr>
<tr>
<td>Thrust-bearing load rating</td>
<td>55,285 lbf</td>
<td>55,285 lbf</td>
</tr>
<tr>
<td>Temperature rating</td>
<td>Standard seals*</td>
<td>320°F (160°C)</td>
</tr>
</tbody>
</table>

*Standard seals are highly saturated nitrile (HSN).

**Wellheads**

Our wellheads are dependable on the design excellence of Hercules casing and tubing heads, which are unmatched in the industry.
Wellheads

Our Hercules patented slip design with positive mechanical stop limits slip travel and reduces stress in the wellhead body. The advanced top metal ring design reduces the gap between the top metal ring halves, preventing packing extrusion and minimizing water and dirt entrapment. Pressure-assisted contoured packing assures positive pack-off with minimum compression. The slip design allows as much weight as the threaded connection will withstand without crushing the casing ID below API drift diameter.

- Patented positive mechanical stop slip design is nonrestrictive to side outlet flow, limits slip travel, reduces hoop stress in wellhead body, slip load capacity equals thread joint capacity and will not crush pipe ID below API drift
- Contoured packing design for improved seal
- Improved top metal ring design prevents packing extrusion
- Interchangeable internal casing head parts on 1,500, 2,000, and 3,000 psi

Options

- Casing head sizes: 7-, 8⅝-, 9⅝-, and 10¾-in. bottom connections
- Tubing head sizes: 2-, 2½-, 3-, 4½-, 5½-, and 7-in. bottom connections
- MWP up to 3,000 psi
- Submersible designs available
- Accessories include flange adaptors, belled nipples, couplings, and tubing clamps

Hookup

Accessories

In order to achieve a complete and tailored configuration for the production service hookup, we offer a range of products to suit the needs of your application: valves, unions, flow tees, chokes, and pressure regulators.
**Hookup Accessories**

**Well King™ Back Pressure Regulators**

- Liquids or gas service
- Reduces paraffin by keeping gas in solution
- Less free gas and better lubrication at the stuffing box
- Increases pump efficiency by keeping bottomhole pressure above the bubble point
- Differential pressure type recommended for systems where downstream pressure is less than 10% of set pressure
- All models have ¼-in. NPT pressure port for upstream pressure gauge installation

**Connections**

- Standard 2-in. male LP inlet x single 2-in. female LP outlet
- Four way cross 2-in. male LP inlet x dual 2-in. female LP outlet
- In-line 2-in. female LP x single 2-in. female LP outlet

**External body shell components for all assemblies have a 2,000-psi “shell test pressure” capability**

**Pressure Range Orifice Ball Size Spring Material**

<table>
<thead>
<tr>
<th>Pressure Range</th>
<th>Orifice</th>
<th>Ball Size</th>
<th>Spring Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 200 psi</td>
<td>.875 in.</td>
<td>1.000 in.</td>
<td>Monel</td>
</tr>
<tr>
<td>10 to 500 psi</td>
<td>.875 in.</td>
<td>1.000 in.</td>
<td>302 SS</td>
</tr>
<tr>
<td>10 to 900 psi</td>
<td>.875 in.</td>
<td>1.000 in.</td>
<td>Carbon steel</td>
</tr>
<tr>
<td>10 to 1,000 psi</td>
<td>.683 in.</td>
<td>1.000 in.</td>
<td>Elgiloy</td>
</tr>
<tr>
<td>10 to 1,500 psi</td>
<td>.683 in.</td>
<td>1.000 in.</td>
<td>Carbon steel*</td>
</tr>
</tbody>
</table>

*Same spring used in 10–900-psi model.

**Optional Sand Trim**

- Carbide-tipped plunger and carbide seat, which replaces ball and seat and lower spring keeper
- Available in 200, 500, 900 and 1,000 psi (not available in 1,500 psi)
- 10–1,000 psi model fully meets NACE MR0175
- Less vibration
- Smoother flow
- More abrasion resistance
- Greater control sensitivity

**Adjustable Choke B-29**

- Thumb screw secures stem-setting position
- Stem can be lubricated with standard grease gun
- Available carbide trim for increased abrasion resistance
- Stainless steel model available by special order for NACE applications

**Specifications B-29**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>B-29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2 x 2 in. LP</td>
</tr>
<tr>
<td>Working pressure</td>
<td>2,000 psi</td>
</tr>
<tr>
<td>Maximum orifice size</td>
<td>¾ in.</td>
</tr>
<tr>
<td>Weight</td>
<td>20 lb</td>
</tr>
</tbody>
</table>

**Note:** Adjustable chokes are not intended to be used as shutoff valves.

---

**Pumping Flow Tees**

- Ductile iron construction
- Most precise alignment in the industry
- Hundreds of thread combinations
- 2-, 2½-, and 3-in. cast-steel tees meeting NACE MR0175 available
- Corrosion-resistant coatings available
- Four-way cross configuration available in 2- and 4-in. LP
- 1-in. NPT stand-on (or smaller) bleed-off port
- 2-in. bleed-off available in some sizes (bleeder port can be left blank by request)

**3,000-psi Working Pressure Heavy-Duty Tees**

<table>
<thead>
<tr>
<th>Model no.</th>
<th>Bottom thread (tubing or LP)</th>
<th>Top thread (tubing or LP)</th>
<th>Major side outlet (LP)</th>
<th>Height</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT-7</td>
<td>2 in.</td>
<td>2 in.</td>
<td>2 in.</td>
<td>6 in.</td>
<td>9 lb</td>
</tr>
<tr>
<td>CT-12</td>
<td>2 in. male</td>
<td>2 in.</td>
<td>2 in.</td>
<td>7½ in.</td>
<td>7 lb</td>
</tr>
<tr>
<td>CT-8</td>
<td>2 in.</td>
<td>2½ in.</td>
<td>2 in.</td>
<td>7½ in.</td>
<td>13 lb</td>
</tr>
<tr>
<td>CT-17</td>
<td>2 in.</td>
<td>3 in.</td>
<td>2 in.</td>
<td>8 in.</td>
<td>18 lb</td>
</tr>
<tr>
<td>CT-9</td>
<td>2 in.</td>
<td>3 in.</td>
<td>2 in.</td>
<td>8 in.</td>
<td>18 lb</td>
</tr>
<tr>
<td>CT-18</td>
<td>2½ in.</td>
<td>2 in.</td>
<td>2 in.</td>
<td>8 in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-10</td>
<td>2½ in.</td>
<td>3 in.</td>
<td>2 in.</td>
<td>8 in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-11</td>
<td>2½ in.</td>
<td>3 in.</td>
<td>2½ in.</td>
<td>8 in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-14</td>
<td>2½ in. male</td>
<td>2½ in.</td>
<td>2½ in.</td>
<td>8 in.</td>
<td>10 lb</td>
</tr>
<tr>
<td>CT-9</td>
<td>2½ in.</td>
<td>2½ in.</td>
<td>2½ in.</td>
<td>8 in.</td>
<td>12 lb</td>
</tr>
<tr>
<td>CT-19</td>
<td>2½ in.</td>
<td>3 in.</td>
<td>2 in.</td>
<td>8 in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-20</td>
<td>2½ in.</td>
<td>3 in.</td>
<td>2½ in.</td>
<td>8 in.</td>
<td>18 lb</td>
</tr>
<tr>
<td>CT-21</td>
<td>3 in.</td>
<td>2½ in.</td>
<td>2 in.</td>
<td>8 in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-22</td>
<td>3 in.</td>
<td>3 in.</td>
<td>2 in.</td>
<td>8 in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-23</td>
<td>3 in.</td>
<td>3 in.</td>
<td>3 in.</td>
<td>8 in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-24</td>
<td>3 in.</td>
<td>3 in.</td>
<td>3 in.</td>
<td>8 in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-25</td>
<td>3 in. male</td>
<td>3 in.</td>
<td>3 in.</td>
<td>8 in.</td>
<td>10 lb</td>
</tr>
<tr>
<td>CT-26</td>
<td>4 in.</td>
<td>4 in.</td>
<td>4 in.</td>
<td>7½ in.</td>
<td>20 lb</td>
</tr>
<tr>
<td>CT-4</td>
<td>4 in.</td>
<td>4 in.</td>
<td>4 in.</td>
<td>7½ in.</td>
<td>21 lb</td>
</tr>
</tbody>
</table>

**Other models available.**

**Note:** Pumping tee test pressure > 1.5 x working pressure (male threads) and 2 x working pressure (female threads).**

**Corrosion-resistant coatings available; contact customer service.**

**CT-1, CT-2, and CT-3 available in carbon steel with welded 3.125-in. 2M or 3M API top flange for attachment of PCP drive head.**

---

**Specifications B-29**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>B-29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>2 x 2 in. LP</td>
</tr>
<tr>
<td>Working pressure</td>
<td>2,000 psi</td>
</tr>
<tr>
<td>Maximum orifice size</td>
<td>¾ in.</td>
</tr>
<tr>
<td>Weight</td>
<td>20 lb</td>
</tr>
</tbody>
</table>

**Note:** Adjustable chokes are not intended to be used as shutoff valves.
Hookup Accessories

Valves
All Hercules and Magnum™ valves provide trouble-free service and are constructed of only the highest-quality materials. Our valves are available in a variety of body styles and materials to meet or exceed applicable industry standards.

Hercules Ball Valves
Material options
- Carbon steel
- Stainless steel
- Bronze
- Ductile iron
- Cast steel

Specifications
- Pressure range 200- to 1,200-psi MWP
- Temperature up to 500°F (260°C)
- Size range ½ to 3 in.

Magnum Valves
Our valves have a 316SS construction that is NACE-compliant.

Configuration options
- Straight pattern
- Angle pattern
- Gauge valves
- Mini valves
- Bleed valves
- Needle valves

Specifications
- Pressure up to 10,000-psi MWP
- Temperature up to 1,000°F (538°C)
- Size range ⅛ to 1 in.

Unions
Our Yale™ union design allows valves and other fittings to be removed easily from the production line. This feature offers special advantages when the fitting is installed in a short section of line, since it is not necessary to "spread" or bend the line when removing the fitting.

Configuration options
- Figure 110 “Insulating Unions”
- Figure 210 “Blanking Union”
- Figure 300 “Insulating Unions”
- Figure 300 “Flat Face”
- Figure 310 “Threaded Choke”
- Figure 800 “Quick Stab”
- Figure 800R “Quick Stab”

Material options
- Carbon steel
- Alloy steel
- Ductile iron

Specifications
- Pressure ranges from 500- to 12,500-psi MWP
- Temperature up to 500°F (260°C)
- Size ranges from ¼ to 8 in.
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