PCPRod® Hollow Series for Progressive Cavity Pumping
Tenaris is a leading supplier of tubes and related services for the world’s energy industry and certain other industrial applications. Our mission is to deliver value to our customers through product development, manufacturing excellence, and supply chain management. We minimize risk for our customers and help them reduce costs, increase flexibility and improve time-to-market.

Tenaris employees around the world are committed to continuous improvement by sharing knowledge across a single global organization.

Through our integrated global network of manufacturing, R&D and service facilities, we work with our customers to meet their needs for the timely supply of high performance products in increasingly complex operating environments.
In PCP systems, a rotating screw-type pump is used and the rotating movement is then transmitted from the surface to the pump through a sucker rod string working mainly under torque stresses, causing the fluid contained in the cavity to flow upwards.

Tenaris’s Research & Development team developed the PCPRod® Hollow Series, a technological breakthrough that not only increases the reliability of progressive cavity pumping (PCP) operations, but also reduces operating costs.

One of the alternatives that the hollow rod presents is the ability to inject diluents through the hollow rod for heavy and extra-heavy crude oil pumping or any other special application. This improves injection efficiency and reduces the complexity of the operation given the elimination of injection pipes and capillaries.

Tenaris has developed the PCPRod® Series, a line of products specially designed for progressive cavity pumping (PCP) applications in the most demanding environments.
Main features

Enhanced operational reliability for PCP applications.

The seamless pipes used to manufacture the PCPRod® Series products combine a low-alloy Chromium-Molibdenum steel with a quenched and tempered heat treatment resulting in a refined microstructure with excellent mechanical properties: Yielding Stress 140 Ksi minimum and Ultimate tensile stress 147 Ksi minimum.

These rods have been developed to work under rotating loads in PCP. This product includes a pipe with box-box ends and a nipple connector that allows an external flush joint (with no variation of the diameter in the joint area), which minimizes turbulence and flow losses.

The flush connection significantly reduces friction between the tubing and the rod string. Therefore, premature wear failures are eliminated.

The range of products with PCPRod® thread includes three models of connections to work with torques up to 1,000; 1,500 and 2,500 lb.ft.

OTHER CHARACTERISTICS

- PCPRod® tapered thread with 8 hpp trapezoidal thread profile and differentiated tapering between pin and box.
- Joint with torque shoulder.
- Diluents, corrosion inhibitors or other fluids can be added through a hollow joint.
- Temperature and pressure sensors can be lowered down the string.

HANDLING AND INSTALLATION

For handling and transportation of PCPRod® Series, the same specifications for conventional sucker rods must be followed. Installation the well site is simple, as no special accessories are needed.

Elevators

Conventional sucker rods elevators are used with a 1” x 2 feet pony rod and a crossover to adjust the PCPRod® Series end when elevating.

Power Tong

The use of standard hydraulic pipe tongs with adapted clamps for an outer diameter of 1.66” or 1.9” is recommended. No special tools are required. For better performance, an electronic torque control device is suggested.

Hanging Slips

Pneumatic slips are used for conventional pipes adapted to outer diameters of 1.66” or 1.9”.

Make-up torque for Hollow Rods

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Min. torque ft.lb</th>
<th>Opt. torque ft.lb</th>
<th>Max. torque ft.lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCPRod®1000</td>
<td>1100</td>
<td>1150</td>
<td>1200</td>
</tr>
<tr>
<td>PCPRod®1500</td>
<td>1500</td>
<td>1550</td>
<td>1600</td>
</tr>
<tr>
<td>PCPRod®2500</td>
<td>2500</td>
<td>2550</td>
<td>2600</td>
</tr>
</tbody>
</table>

Technical Specifications

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Pipe outer Ø</th>
<th>Pipe thickness</th>
<th>Upset outer Ø</th>
<th>Max. working torque *</th>
<th>Metric weight without nipple</th>
<th>Length range</th>
<th>Joint min. int. Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCPRod®1000</td>
<td>48.8 mm - 1.9&quot;</td>
<td>6.7 mm - 0.26&quot;</td>
<td>No upset</td>
<td>1,000 ft.lb</td>
<td>6.95 kg/m - 4.6 Lb/ft</td>
<td>8.5 to 9.75 m - 28 to 32 ft</td>
<td>20 mm - 0.79&quot;</td>
</tr>
<tr>
<td>PCPRod®1500</td>
<td>48.8 mm - 1.9&quot;</td>
<td>6.7 mm - 0.26&quot;</td>
<td>No upset</td>
<td>1,500 ft.lb</td>
<td>6.95 kg/m - 4.6 Lb/ft</td>
<td>8.5 to 9.75 m - 28 to 32 ft</td>
<td>18 mm - 0.71&quot;</td>
</tr>
<tr>
<td>PCPRod®2500</td>
<td>48.8 mm - 1.9&quot;</td>
<td>6.7 mm - 0.26&quot;</td>
<td>60 mm - 2.36&quot;</td>
<td>2,500 ft.lb</td>
<td>6.95 kg/m - 4.6 Lb/ft</td>
<td>8.5 to 9.75 m - 28 to 32 ft</td>
<td>20 mm - 0.79&quot;</td>
</tr>
</tbody>
</table>

*Tenaris recommends using a 0.9 safety factor to maximize fatigue resistance.
Advantages of PCPRod® Hollow Series

Tenaris’s PCPRod® Hollow Series increases the reliability of progressive cavity pumping (PCP) operations and offers several benefits at the rig.

- Reduces premature failures due to rod pin breakage caused by over torque during well operations, given its make-up procedure and connection design for torque applications.
- Reduces tubing wear failures due to the design of its flush and near flush joints.
- Reduces the backspin effect and enhances torque transmission (stick-slip effect).
- Increases the safety of rig personnel since it reduces accumulated turns in the string and therefore the possibility of backspin effects during workover operations.
- Increases the effectiveness of corrosion inhibition or any other diluents action while being injected through the hollow rod.
- Reduces handling problems, as its installation does not require special tools.

Building upon its vast field experience in handling sucker rods, Tenaris offers a comprehensive range of services to meet its customers’ operational needs. Experienced field engineers are on hand to assess our customers’ operations in the field in order to improve all aspects related to the sucker rod string. Also, technical assistance is provided for well completion.

Tenaris offers a wide range of high quality products to complete the rod string and increase its life and performance:

- Pup joints (pony rods) to adjust string length.
- Combination crossover between API conventional thread and PCPRod® Hollow thread.
- Polished and chromium-plated hollow rods.
- Rotating joints (swivels) for diluent injection.
- Slotted pup joints that allows fluid injection into the tubing at any depth.
- Safety-check valves.
Well configurations with PCPRod® Hollow Series

A trustworthy technology that offers versatility to our customers’ operations.

A TRUSTWORTHY TECHNOLOGY
Progressive Cavity Pumping systems add versatility to your operations at the rig. They offer all the advantages of a positive displacement pump and are specially designed for the most demanding applications. Tenaris PCPRod® Hollow Series provide dependable performance and long life in handling a wide variety of fluids.

OIL PRODUCTION THROUGH THE TUBING - HOLLOW ROD ANNULUS
OIL PRODUCTION THROUGH THE TUBING - HOLLOW ROD ANNULUS & THE INNER DIAMETER OF THE PCPROD® HOLLOW STRING

FLUID INJECTION

PCP WELLHEAD

FLOWLINE

API POLISHED ROD

API POLISHED ROD COUPLING

API THREAD TO PCPROD® THREAD CROSSOVER

API THREAD TO PCPROD® THREAD CROSSOVER

API COUPLING

PCP PUMP ROTOR

SLOTTED PUP JOINT

PCPROD® NIPPLE

PCPROD® STRING (HOLLOW RODS AND NIPPLES)

PCPROD® STRING (HOLLOW RODS AND NIPPLES)

PCPROD® STRING

PCPROD® STRING

PRODUCED OIL

PRODUCED OIL

PRODUCED OIL

PRODUCED OIL

CASING

TUBING

INJECTED FLUID

PRODUCED OIL

PRODUCED OIL

CASING

TUBING
SUCKER RODS

Argentina
Alejandro De la Serna
adelaserna@tenaris.com
(54) 11 4018 2582 tel
(54) 11 4018 9280 fax

Brazil
Jesley Neves
jneves@confab.com.br
(55) 12 3644 9536 tel
(55) 12 3644 9402 fax

Canada
Juan Pablo Martin
jpmartin@tenaris.com
(1) 403 7670213 tel
(1) 403 7670299 fax

Colombia
Esteban Foresi
eforesi@tenaris.com
(54) 2637 4 40839 tel
(54) 2637 4 2110 fax

Mexico
Eduardo I. Martinez Albarran
ealbarran@tamsa.com.mx
(52) 229 989 4431 tel
(52) 229 989 1119 fax

United States
Leonardo Marraffini
lmarraffini@tenaris.com
(1) 713 398 9122 tel
(1) 713 767 4444 fax

Venezuela
Jose Jaime Garcia
jgarcia@tenaris.com
(58) 212 600 3999 tel
(58) 212 600 3691 fax

Other countries
Esteban Foresi
eforesi@tenaris.com
(54) 2637 4 40839 tel
(54) 2637 4 2110 fax