With the history of more than 40 years experience, GMP has been developed into one of the biggest subsurface sucker rod pump manufacturers in China. Besides tubing pump and rod pump, the plant also developed series special purpose pumps to meet the

Subsurface pumps manufactured by the plant comply strictly with API standard, GB/ T18607 -2001 Specification for Subsurface Sucker Rod Pumps and Fittings, or Q/SJ0087 -2003 Subsurface Pumps, and the product was authorized to use API Spec 11 AX monogram (Certificate No.11 AX-0058). From design to the complete products, all procedures are controlled by ISO9001 quality control system.

Subsurface pumps have two different types: tubing pumps and rod pumps. We call pumps which manufactured strictly according to standard as conventional subsurface pumps, and other pumps which have different structures, for example, thick-oil recovery pumps, anti-gas lock pumps, sand control pumps, as special purpose pumps.

Its operation principle is as follows: during the up-stroke, the plunger drives the fluid in the upper chamber into the tubing on the pump, and at the same time, fluid in the well flows into and fills the lower chamber of the pump under the action of the differential pressure. During the downstroke, fluid in the lower chamber flows into the upper chamber through the traveling valve. The well fluid is pumped to the ground by the reciprocating motion of the plunger.

**Sucker Rod Pump (Rod Type)**

The whole pump can be assembled and connected to the lower end of the sucker rod on the ground, run into the well as a unit, and fixed in the tubing by seating nipple pre-fitted in the tubing at the required depth (pump setting depth). The workover operation time for a rod pump well is much shorter than a tubing pump well by at least 50%. Rod pump have three types, they are Traveling Barrel Bottom Anchor Rod pump, Stationary Heavy Wall Barrel Bottom Anchor Rod Pump and Stationary Heavy Wall Barrel Top Anchor Rod Pump.
1. Stationary Barrel Bottom Anchor Rod Pump - RHBC and RHBM
It's suitable for deep well since the barrel only bears pressure from outside and does not bear tensile load and its clearance change is small. But it is not recommended for sandy wells since there is no circulation for the well fluid around the outside of the barrel so pump may become stuck in the tubing by packed sand.

2. Stationary Barrel Top Anchor Rod Pump - RHAM and RHAC
The top anchored pump with stationary barrel is suitable for sand production well since the fluid discharged from the guide cage washes away the sand between tubing and the top of the pump. But the pump barrel is more subject to inside pressure and tensile load caused by the fluid column, and the plunger clearance will intend to increase during up stroke so the top anchored pumps are not recommended in deep wells.

3. Traveling Barrel Bottom Anchor Rod Pump - RHTC and RHTM
In this pump, the barrel is attach to, and moves up and down with the sucker rod string. The plunger is connected to the hold-down by a hollow pull tube and remains stationary. The traveling barrel pump is recommended for sandy wells since the movement of the traveling barrel keeps the fluid in motion and sand washed down, which minimizes the possibility of sand setting around the pump and sticking it. The traveling barrel is particularly recommended for wells being pumped intermittently since the ball in the top cage will seat when the well is shut down, sand cannot settle inside of the pump. The traveling barrel pump is not suitable for gassy wells and viscous fluid wells. It is not recommended for the pumps with long stroke in deep wells, either.

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**Sucker Rod Pump (Tubing Type)**

The barrel assembly and the standing valve assembly of the pump can be mounted and connected to the tubing on the ground, which are run into the well first, then connect the plunger assembly with the lower end of the sucker-rod and run them into the pump. Tubing pump has the characteristics as large flow rate, tight and sound structure. Standing valve has two types: non-pullable and pullable. The pullable standing valve tubing pump has cup type and mechanical type.

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The plant also can offer parts and components of sucker rod pump according to the use's requirements, such as barrels, plungers, valve balls, seats and cages, etc.

The common combinations of the material and surface treatment for the barrel and plunger manufactured in the plant are as follows:

**A. NITRIDED BARREL AND SPRAY WELDED PLUNGER**

The nitrided barrel is high in hardness, good in antiwear capacity and long in life (longer than that of the common barrel by 1.2 times).

The spray welded plunger is good in anticorrosion capacity. The welded layer of the plunger is melted together with the metal base, without layer difference of plating plungers and without ciusting, flake and pinhole. It can be used in various well conditions.

**B. NICKEL-PHOSPHOR PLATED BARREL AND SPRAY WELDED PLUNGER**

Nickel-phosphor plated barrel is an anti-corrosion barrel. The Nickel-phosphor plated layer has a uniform single phase structure, which can resist electrochemical reaction of micro-batteries and the plated layer is lower in porosity, tight in structure and stable in chemical property and it is not easy for the corrosive materials to enter in.

**C. CHROME PLATED BARREL AND SPRAY WELDED PLUNGER**

**D. NITRIDED BARREL AND CHROME PLATED PLUNGER**
E. NICKEL-PHOSPHOR PLATED BARREL AND CHROME PLATED PLUNGER

The materials used to make valve balls and seats for above 5 combinations of the barrel and plunger are: high-carbon stainless steel, carbide alloy, ceramic, etc.

THEIR CHARACTERISTICS ARE:

1. Stainless steel seat is cheap and is most widely used.
2. Carbide alloy seat is high in hardness, large in density and strong in anti-corrosion capacity and applies to the wells with viscous crude or containing sand.
3. Ceramic seat is higher than that of carbon steel or alloy in anti-impact capacity and strong in anti-corrosion capacity. Its life is about 4.4 times as long as that of the common steel seat.

Special Purpose Sucker Rod Pumps

Based on the conventional subsurface pumps, a series of special purpose pumps were developed, which can apply to different well conditions.

1. Long Plunger Pump
The pump has a short barrel, a long plunger and two standing valves, which increase the reliability of the seal. Ball and seat use special material which has higher hardness to increase the whole pump's anti-corrosion and impact resistance capacity. The pump is long in life and high in efficiency and applies to wells of sand content less than 0.1%.

2. Long Plunger and Anti-sandsticking Pump
The pump is improved based on the long plunger tubing pump by adding a sand settling tube and a joint, thus preventing the pump from being stuck by sand. The pump can be used in the wells of sand content about 0.8%.

The pump consists of a barrel assembly, a plunger assembly and a sand control assembly. It has long plunger and short pump barrel so that the plunger seals the barrel all the time. Because of the special heat treatment towards the inside surface at the barrel, it is much better than the standard barrel in antiwear and anticorrosion capacity.
3. Suspension Pump
The barrel of the pump is suspended, so the load on the barrel is small and the deformation of the barrel is small so as to avoid sticking pump because of the elongation and attenuation of the barrel. As compared with the common pumps, the pump is longer in life.
It is mainly composed of barrel assembly, plunger assembly and outer tube assembly.

4. Series Connection Pump
There are two different barrels and plungers in series connection. According to the theory of hydraulic feedback, during the down stroke, a downward force is formed to overcome the friction between the viscous crude and the sucker rod, thus improving the load condition on the sucker rod and decreasing and eliminating the disconnection and break at the sucker rod. The pump applies to the wells of oil viscosity less than 4000 mPa*s (50 °C), the wells with thin oil and the viscous oil wells without thermal recovery conditions.
There are some special purpose pumps of other structure. The plant can also design and manufacture special purpose pumps of different sizes and usages according to customers requirements.