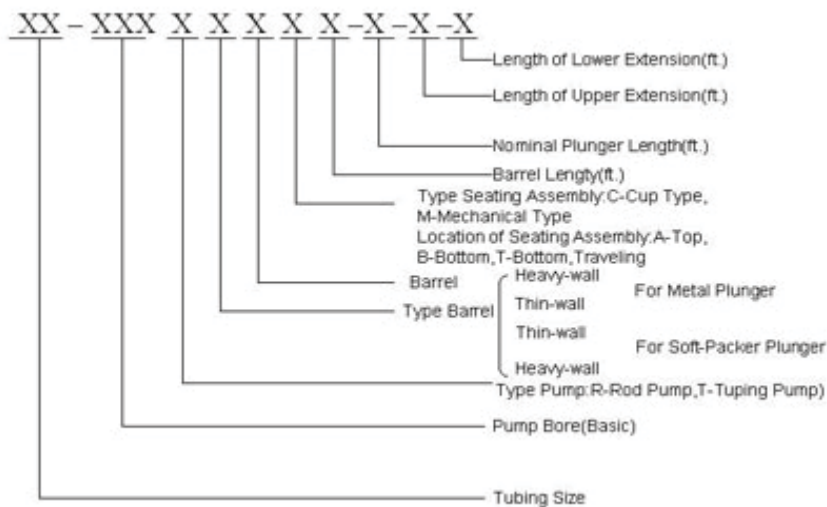


SUBSURFACE PUMP

Subsurface Pump (Rod Type)

Subsurface pump(rod type), also called as sucker rod 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 work-over 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.

Pump Designation



1) Stationary Barrel Bottom Anchor Rod Pump-RHBC and RHBM

Stationary barrel bottom anchor rod pump is 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.

Technical Specifications of Stationary Barrel Bottom Anchor Rod Pump-RHBC and RHBM

Specification	Nominal Pump Bore (in)	Plunger Length(ft)	Max. O.D. (mm)	Rod (in)	Tubing (in)	Pump Constant (m ³ /d)	Stroke (m)
20-112RHBC	1.12	39,178	46.7	39,145	2.375	0.92	≤7.5
20-112RHBM			44.7				
20-125RHBC	1.25		47.5	39,145	2.375	1.14	
20-125RHBM			44.7				
25-150RHBC	1.5		59.5	39,145	2.875	1.64	
25-150RHBM			55.6				
25-175RHBC	1.75		59.5	39,145	2.875	2.24	
25-175RHBM			55.6				
30-225RHBC	2.25		72.1	39,145	3.5	3.69	
30-225RHBM			71.7				

2) Stationary Barrel Top Anchor Rod Pump-RHAM and RHAC

The top anchor rod 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.

Technical Specification of Stationary Barrel Top Anchor Rod Pump-RHAM and RHAC

Specification	Nominal Pump Bore (in)	Plunger Length (ft)	Max. O.D. (mm)	Rod (in)	Tubing (in)	Pump Constant (m ³ /d)	Stroke (m)
20-112RHAC	1.12	39,178	46.7	39,145	2.375	0.92	≤7.5
20-112RHAM			47.6				
20-125RHAC	1.25		47.5	39,145	2.375	1.14	
20-125RHAM			50.2				
25-150RHAC	1.5		59.4	39,145	2.875	1.64	
25-150RHAM			59.5				
25-175RHAC	1.75		59.5	39,145	2.875	2.24	
25-175RHAM			59.5				
30-225RHAC	2.25		72.1	39,145	3.5	3.69	
30-225RHAM			74.6				

3) Traveling Barrel Bottom Anchor Rod Pump-RHTC and RHTM

For traveling barrel bottom anchor rod pump, the barrel is attached 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.

Technical Specifications of traveling barrel bottom anchor rod pump- RHTC and RHTM

Specification	Nominal Pump Bore (in)	Plunger Length (ft)	Max. O.D. (mm)	Rod (in)	Tubing (in)	Pump Constant (m ³ /d)	Stroke (m)
20-125RHTC	1.25	39,178	46.7	39,145	2.375	1.14	≤7.5
20-125RHTM			44.7				
25-150RHTC	1.5		59.4	39,145	2.875	1.64	
25-150RHTM			59				
25-175RHTC	1.75		59.4	39,145	2.875	2.24	
25-175RHTM			59				
30-225RHTC	2.25		72.1	39,145	3.5	3.69	
30-225RHTM			71.7				

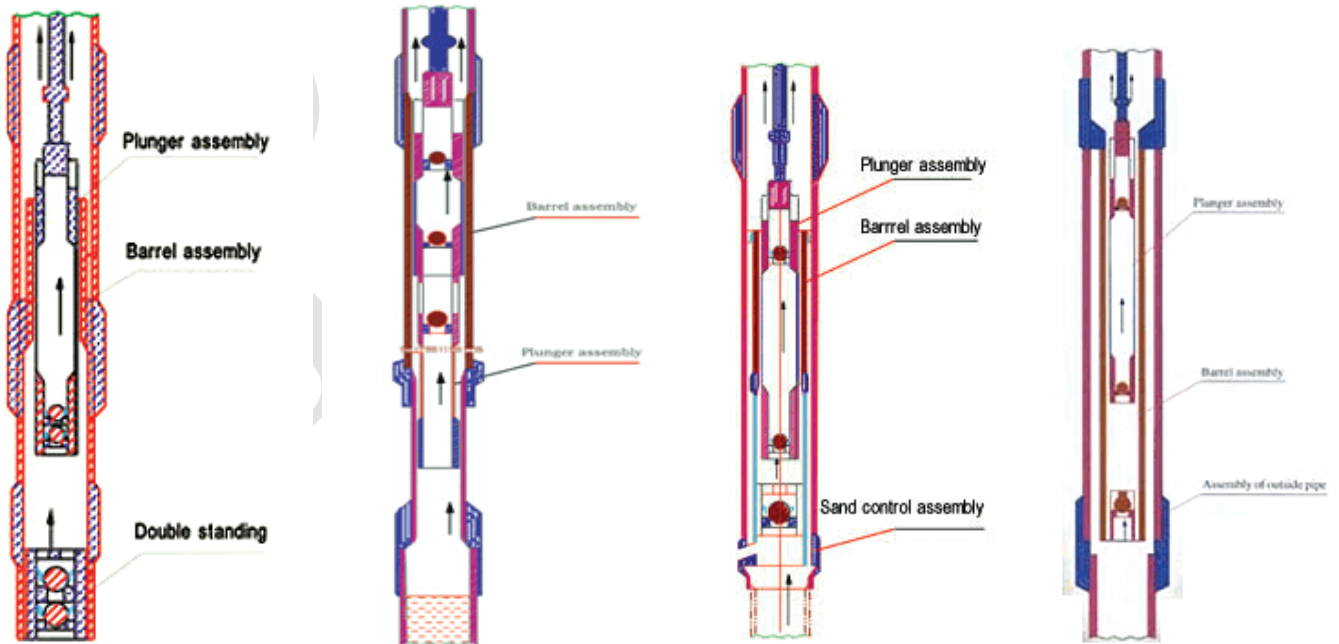
Subsurface Pump (Tubing Type)

The barrel assembly and the standing valve assembly of tubing subsurface 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-pulling and pulling. The pulling standing valve tubing pump has cup type and mechanical type.

Technical Specifications of subsurface pump(Tubing Type)

Pump Designation	Pump Bore (in)	Length of Plunger (mm)	Range of Stroke (mm)	Pump Sonstant (m ³ /d)	Size of Matched Tubing (in)	Size of Connecting Sucker Rod (mm)	Length of Extension Coupling (mm)
25-125	1.25	600~1,200	600~1,200	1.14	2-1/2 2-7/8	16	300~900
25-150	1.5			1.642	2-1/2 2-7/8	16	
25-175	1.75			2.235	2-1/2 2-7/8	16	
20-175				3.694	2.875	19	
25-225	2.25			5.518	2.875	22	
25-275	2.75			5.518	3.5	22	
30-275	2.75			7.707	3.5	22	
30-325	3.25			10.261	3.5	25	
30-375	3.75			10.261	4	25	
40-375	3.75						

Special Purpose Sucker Rod Pumps



There are some special purpose subsurface pumps of other structure. Special purpose subsurface pumps of different sizes and usages according to customers' requirements can be designed and manufacture.

1. Long Plunger Pump

Long plunger 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. Long plunger 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-sand Sticking Pump

Long plunger and anti-sand sticking 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.

Long plunger and anti-sand sticking pump can be used in the wells of sand content about 0.8%, and consists of a barrel assembly, a plunger assembly and a sand control assembly. The pump has long plunger and short barrel so that the plunger seals the barrel all the time. Because of the special heat treatment towards the inside surface of the barrel, it is much better than the standard barrel in anti-wear and anticorrosion capacity.

3. Suspension Pump

The barrel of suspension 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. Compared with common pumps, suspension 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 pump. 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 of the sucker rod.

The pump applies to the wells of oil viscosity less than 4,000

MPa·s (50°C), the wells with thin oil and the viscous oil wells without thermal recovery conditions.

There are some special purpose subsurface pumps of other structure. Special purpose subsurface pumps of different sizes and usages according to customers' requirements can be designed and manufacture.