



API 11AX SUBSUR FACE SUCKER ROD PUMPS

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API 11AX Subsurface Sucker Rod Pumps

II. Parameter of Component Parts and Control

1. Parameter of Pump Barrel Component Parts and Control Measures

Basic Parameter:

Surface Treatment Method	Plating Thickness mm	Surface Hardness	Core Hardness HB
Chrome Plating	≥0.08	67-71HRC	207-240
Nickel-phosphate plating	≥0.05	66-69HRC	207-240

2. Parameter of Metal Plunger Surface Treatment

Surface Treatment Method	Plating thickness mm	Surface Hardness HRC	Core hardness HB
Chrome Plating	≥0.10	≥67	207-240
Painting(welding)	≥0.25	56-62	207-240

3. Material and Hardness of Valve Ball and Valve Seat

Material	6Cr18Mo	9Cr18Mo	carbon tungsten alloy
Valve Ball	--	58-65HRC	≥89HRA
Valve Seat	52-56HRC	--	≥88HRA

III. API SRP Introduction

1. Stationary Barrel, Top Anchor Rod Pump

The type of seating assembly for Stationary Barrel, Top Anchor Rod Pump : Cup & Mechanical, the designation is RHAM for mechanical and RHAC for Cup.

Specification	Pump Size	Max. O.D	Size of Sucker Rod	Tubing Size
20-112RHAC	28 (1.12)	47.5	3/4	2 ³ / ₈
20-112RHAM		47.6		
20-125RHAC	32 (1.25)	47.5		2 ³ / ₈
20-125RHAM		47.6		
25-150RHAC	38 (1.50)	59.4		2 ⁷ / ₈
25-150RHAM		59.5		
25-175RHAC	44 (1.75)	59.4		2 ⁷ / ₈
25-175RHAM		59.5		
30-225RHAC	57 (2.25)	72.1		3 ¹ / ₂
30-225RHAM		72.2		



2. Stationary Barrel, Bottom Anchor Rod Pump

The type of seating assembly for Stationary Barrel, Bottom Anchor Rod Pump : Cup & Mechanical, the designation is RHBM for mechanical and RHBC for Cup.

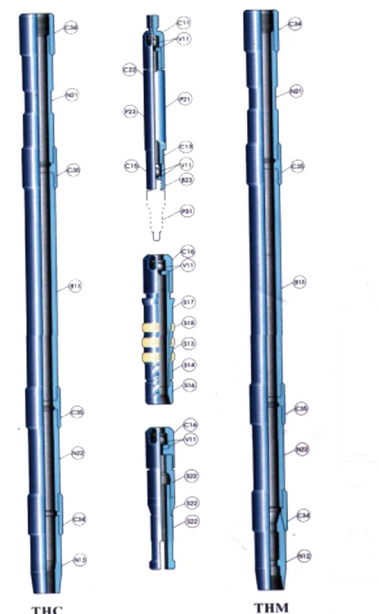
Specification	Pump Size	Max. OD	Sucker Rod Size	Tubing Size
20-112RHBC	28 (1.12)	47.5	3/4	2 3/8
20-112RHBM		44.7		
20-125RHBC	32 (1.25)	47.5	3/4	2 3/8
20-125RHBM		44.7		
25-150RHBC	38 (1.50)	59.4	3/4	2 7/8
25-150RHBM		57.4		
25-175RHBC	44 (1.75)	59.5	3/4	2 7/8
25-175RHBM		57.4		
30-225RHBC	57 (2.25)	72.1	3/4	3 1/2
30-225RHBM		70.1		



3. Tubing Pump

The Tubing Pump is divided into two types: THD & THC/THM.

Specification	Pump Size mm(in.)	Max. OD mm	Sucker Rod Size in.	Tubing Size in.	Stroke m
20-125TH	32 (1.25)	73	3/4	2 3/8	≤7.3
25-125TH	32 (1.25)	88.9	3/4	2 7/8	
20-150TH	38 (1.50)	73	5/8 or 3/4	2 3/8	
25-150TH	38 (1.50)	88.9	5/8 or 3/4	2 7/8	
20-175TH	44 (1.75)	73	3/4	2 3/8	
25-200TH	51 (2.00)	88.9	3/4	2 7/8	
25-250TH	63.5 (2.50)	88.9	3/4	3 1/2	
30-275TH	70 (2.75)	108	7/8	3 1/2	
35-325TH	83 (3.25)	116	7/8	4	
40-375TH	95 (3.75)	116	1	4 1/2	

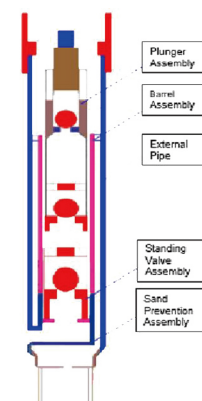


IV. Special Pump

Long Plunger Sand Prevention SRP

1. Avoid sand Burial and effectively prevent the occurrence of sucker rod getting buried by sand.
 2. Avoid sand stuck, effectively prevent the sand gains entering the gap between plunger and barrel to avoid sand stuck.
 3. Avoid Sand abrasive, effectively prevent the sand grains entering the gap between plunger and barrel to avoid the abrasiveness between plunger and barrel.
 4. Long Life, the failure type in the sand wells is valve leakage or gap leakage, the sand abrasion for barrel and plunger is the main reason for gap leakage, this pump can effectively avoid the abrasion to prolong the life.
- Features: Effectively solve the problems of sand stuck in the tiny sand wells and applicable for the wells with sand less than 0.8% .

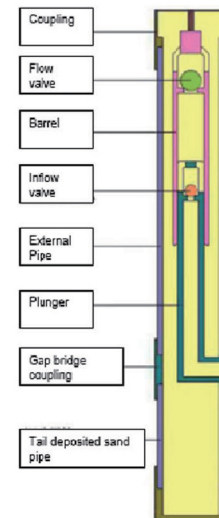
Nominal OD (mm)	Stroke (m)	Connected Thread (up/down)	Max.OD (mm)	Total Length (mm)
Φ44.45	2.1—5.1	31/2TBG/27/8TBG	110	4300—7600
Φ57.15	2.1—5.1	31/2TBG/27/8TBG	114	4300—7600



Traveling barrel tubing pump for preventing from sand wedging

The pump has a simple structure of a standing plunger and a traveling barrel. The flow path of the pump is designed and manufactured as a streamlined structure. The sucker rod of the pump is difficult to split and the plunger has advantages of corrosion-resisting and wear-resisting and long service life, so it is difficult for sand wedging and sand deposit in the barrel. The pump is suitable for serious sandy wells.

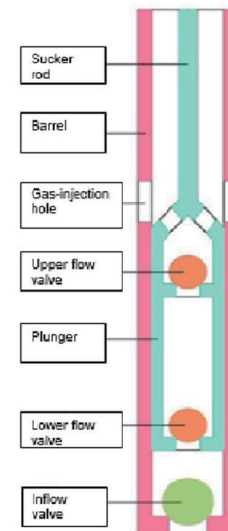
Pump bore (mm)	Length of plunger (m)	Length of barrel (m)	Size of connecting tubing (in)	Range of stroke (m)	Pump constant	Size of connecting sucker rod	Max outside diameter (mm)
38	1.1	4.5-6.6	3-1/2 TBG	4.5-6	1.64	CYG19	100
44			3-1/2 TBG		2.23	CYG19	100
57			4 TBG		3.69	CYG19	108/114



Bumping pump for sucking hot oil

The pump is mainly suitable to be used in high-viscosity well, on the mouth of which a set of vapour injection (viscosity-breaking) have been set up. The work circulation of injecting vapour rotaty sucking can be realized without moving the tubing string. When vapour (or other viscosity-breaker) is being injected, lay down the plunger to "bump the pump", then vapour can be injected to the bottom of the well. When rotating sucking, distance of lifting the plunger to avoid bumping is 0.8m, then it can work normally.

Pump bore (mm)	Length of plunger (m)	Length of barrel (m)	Range of stroke (m)	Pump constant	Size of connecting sucker rod	Size of connecting tubing (in)
32	1.5+1.5	6.0-7.8	2.4-3.3	1.14	CYG19	2-7/8 TBG
38				1.64		2-7/8 TBG
44				2.23		2-7/8 TBG
57				3.69		2-7/8-3-1/2 TBG



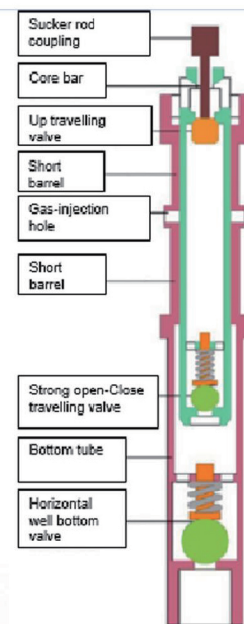
Steam injection thermal recovery single-use sting pump

Steam injection pump is developed according to the characteristics of the heavy oil lifting, the difference of the normal work process of this pump from the common pump is that it can be used for special well conditions, such as deviated well and horizontal well etc. When steam injection, lifting the sucker rod, the plunger will lift accordingly, when the plunger is higher than the sealed chamber about 200mm, the steam injection hole of the sealing tube and the upper tubing string will be linked together, thus steam injection operation can be achieved.

After the completion of the steam injection operation, the sucker rod fall back, the plunger will also be back to work location. At this point, the plunger enter the pump barrel and seal the steam injection hole, after adjust the impingement distance, sucker rod pump system can return to the impingement distance, sucker rod pump system can return to the working state.

The operation mode of this kind of pump is the same as subsurface tubing pump.

Pump bore (mm)	Length of plunger (m)	Length of barrel (m)	Size of connecting tubing (in)	Range of stroke (m)	Pump constant	Size of connecting sucker rod	Max outside diameter (mm)
44	4.2-7.8	12+1.2	2-7/8 TBG	3.0-6.0	2.23	CYG19	88.5
57			2-7/8 TBG		3.69	CYG19	88.5
70			3-1/2 TBG		5.52	CYG22	108



Hydraulic Feedback Heavy Oil SRP

The barrel and plunger of this pump is connected with the barrel & pump of $\phi 57.15$ ($\phi 69.85$) $\phi 38.10$ ($\phi 44.45$), according to the hydraulic feedback principle, when the strokes going down will generate a downward push to get rid of the friction between heavy oil and sucker rod, lessen the alternating load of sucker rod to lessen and avoid the break-off of rod string, It is applicable for the viscosity less than 5000mPa, also for low viscosity and frequent break-off wells, and change the stress state of sucker rod and to provide reliable guarantee for heavy oil well.

Nominal Diameter (mm)	$\phi 57.15 / \phi 38.10$	$\phi 69.85 / \phi 44.45$
Plunger Length(mm)	900	900
Barrel Length (mm)	4500	4500
Top Tubing Thread	2 7/8 TBG	3 1/2 TBG
Bottom Tubing Thread	2 7/8 TBG	2 7/8 TBG
Sucker Rod Thread	CYG19	CYG22
Pump Constant (m ³ /d)	1.913	3.520
Max. OD (mm)	88.9	108
Max. Pump Depth (m)	2000	1600

Mechanical Valve-type Pump

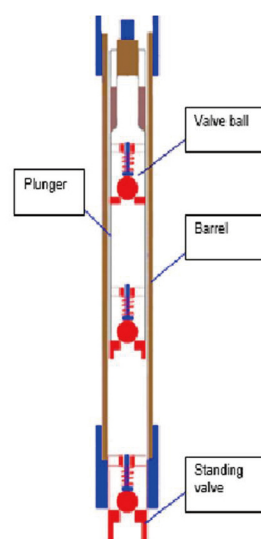
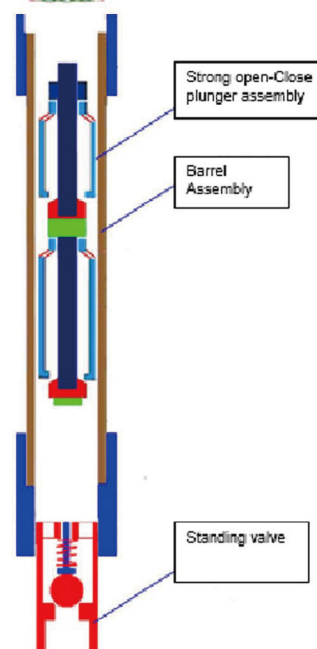
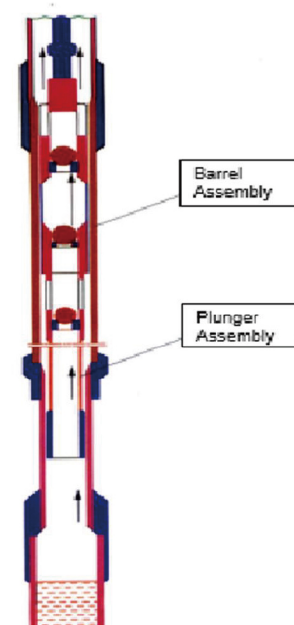
1. The plunger adopts double mechanical valve body structure, the valve body will be mandatory open and closed, it has good sealing and applicable for wells of viscosity less than 5000mPa.s.
2. Applicable for the open and closed hysteresis wells while conventional pump valve body in operation such as heavy oil well, sand producing well, paraffin-troubled well, deviation well etc.
3. Improve the pump efficiency of special wells.
4. It can be matched with all kinds of downhole tools.

Nominal Diameter (mm)	57.15	69.85
Top Plunger Length (mm)	300	300
Bottom Plunger Length (mm)	900	900
Connected Thread	2 7/8 TBG 2 7/8 TBG	3 1/2 TBG 2 7/8 TBG
Max. OD (mm)	88.9	108
Stroke Range (mm)	3.3-7.3	3.3-7.3
Pump Constant (m ³ /d)	5.54	7.791

Deviation Well Pump

1. Inlet & outlet oil valve can be mandatory closed. It resolved problems for valve ball closed hysteresis.
2. The valve bonnet and spring act as a centralizer; It solved the problems when pumping oil in the deviation well, the plunger got eccentric wear, valve ball closed hysteresis and break-off which improved the working life and volume efficiency.
3. Applicable for the well that the deviation of the pump setting point less than 45 degree.

Model	$\phi 44$	$\phi 57$	$\phi 70$
Plunger Length (mm)	900	900	900
Connected Thread	2 7/8 TBG 2 7/8 TBG	2 7/8 TBG 2 7/8 TBG	3 1/2 TBG 2 7/8 TBG
Max. OD (mm)	88.9	88.9	108
Stroke (mm)	3.3-7.3	3.3-7.3	3.3-7.3

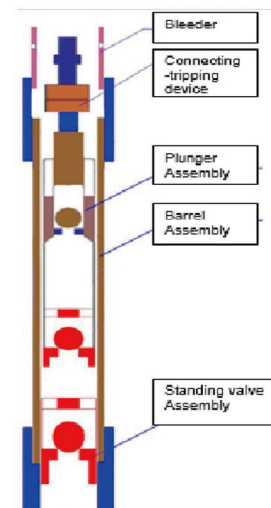


Complete Set Pump

The pump has realized a complete set with drainage device, connecting-tripping device and sucker rod pump. It adopts slide-type drainage device and rotary connecting-tripping device, simple structure, easy to use and high reliability, the whole pump has long working life, matching tools, large liquid withdrawal and easy operation, it is suitable for large liquid production wells.

325TH, 375TH (φ83, φ95) Complete set pump is equipped with slide-type drainage device and rotary connecting-tripping device based on the φ83, φ95 conventional pump, which developed the working condition of φ83, φ95 pump.

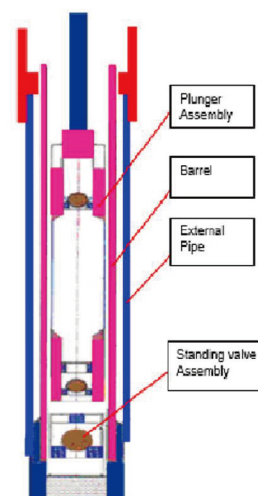
Pump Diameter (mm)	φ82.55	φ95.25
Plunger Length (mm)	1200	1200
Connected Thread	3 1/2TBG	3 1/2TBG
Max. OD (mm)	φ117	φ117



Suspended Pump

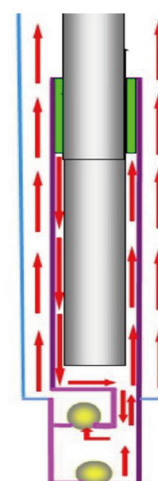
In the process of pumping oil, as the bottom tail pipe of the pump is a little longer or packer in operation, the barrel will endure larger tension, and the barrel will occur reducing deform under this force, which increase the downward resistance of the plunger and will occur pump stuck when serious. The so-called suspended pump actually is building a stress bridge between couplings of conventional pump, while the barrel is anchored outside the pipe only for one side, therefore, it can avoid the deformation of the barrel.

Nominal Diameter (mm)	φ38.10	φ44.45
Plunger Length (mm)	1200	1200
Top tubing thread	2 7/8TBG	2 7/8TBG
Bottom tubing thread	2 7/8TBG	2 7/8TBG
Connected Sucker rod size	3/4	3/4
Max. OD (mm)	108	108



Small displacement plunger pump

Small displacement plunger pump can match the low-yielding, low permeability oil mine. The use of this pump can be good for achieving the potential of oil mine, increasing the depth of using this kind of pump. Finally, a small pump can achieve deep drawing. The innovative use of solid structure in the pump plunger can cause a significant increase in the oil flow and reduce the flow resistance. Meanwhile, the unique structure of the pump can lead to the reduce of leakage while the pressure increases. Moreover, the use of long-plunger structure can prevent the damage from the pump barrel fouling, plunger jam due to sand. It can reduce abrasion, improve working efficiency and extend work-over free period.



V. Equipment photos



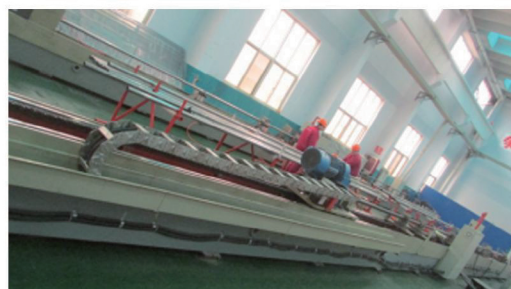
Precision rolling equipment



Pressure test bench



Plating Equipment



Deep Hole Honing Machine



Numerically controlled lathe



Hydraulic makeup and breakout unit



Storage area



Rolling mill

Inspection Equipment



Spectrograph



Metallographic analysis



Tensile test equipment



Impulse test equipment

VI. SRP Shipment and Storage

1. In the process of transporting pump, bend, scratches and dents caused by touch between pumps may affect the use. And even they may cause scrap.
2. The pump in truck should be packaged and placed on a smooth and stable flat without touch from outsides. The pump should be put on three or more supports in same height. If the pump end is suspended over 1.5 meters, it should be set bracket.
3. For preventing damage in the transit, measures, such as connection protective cap or pulling the plunger head with a lead wire, should be done. And pump should place towards the front for preventing accident from dropping the pump parts.
4. In the transportation, the open ends of the pump must be bandaged to prevent sand, dust and other contaminants from entering the tube.
5. Manual handling in a short distance must have more than three staff. They should hold the body of pump along body evenly and gently to prevent the damage in the process.