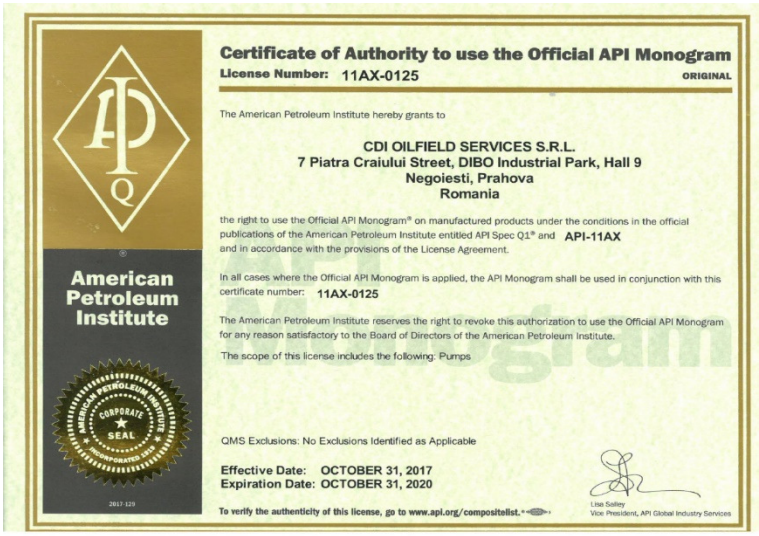
CDI
OILFIELD SERVICES

SUCKER ROD PUMPS



Industry recognized certification

Our products are covered by a range of industry recognized certifications and standards, such as API 11AX, ISO 9001:2015/API Q1, ISO 14001:2015 and OHSAS 18001:2007. Quality of our products, confirmed by international certificates, provides for excellent performance of oil wells. We are proud to be part of success story of our customers.



Certificate of Authority to use the Official API Monogram

License Number: 11AX-0125 **ORIGINAL**

The American Petroleum Institute hereby grants to

CDI OILFIELD SERVICES S.R.L.
7 Piatra Craiului Street, DIBO Industrial Park, Hall 9
Negoiesti, Prahova
Romania

the right to use the Official API Monogram® on manufactured products under the conditions in the official publications of the American Petroleum Institute entitled API Spec Q1® and **API-11AX** and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram shall be used in conjunction with this certificate number: **11AX-0125**

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following: Pumps

QMS Exclusions: No Exclusions Identified as Applicable

Effective Date: OCTOBER 31, 2017
Expiration Date: OCTOBER 31, 2020

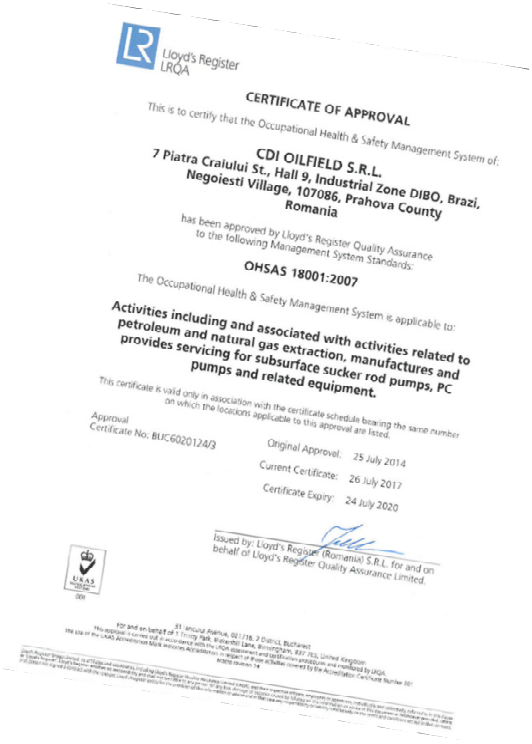
To verify the authenticity of this license, go to www.api.org/compositelist.

Lisa Salley
Vice President, API Global Industry Services

American Petroleum Institute

CORPORATE SEAL

2017-129



Lloyd's Register LRQA

CERTIFICATE OF APPROVAL

This is to certify that the Occupational Health & Safety Management System of:

CDI OILFIELD S.R.L.
7 Piatra Craiului St., Hall 9, Industrial Zone DIBO, Brazi,
Negoiesti Village, 107086, Prahova County
Romania

has been approved by Lloyd's Register Quality Assurance to the following Management System Standards:

OHSAS 18001:2007

The Occupational Health & Safety Management System is applicable to:

Activities including and associated with activities related to petroleum and natural gas extraction, manufactures and provides servicing for subsurface sucker rod pumps, PC pumps and related equipment.

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

Approval Certificate No: BUC6020124/3

Original Approval: 25 July 2014
Current Certificate: 26 July 2017
Certificate Expiry: 24 July 2020

Issued by: Lloyd's Register (Romania) S.R.L. for and on behalf of Lloyd's Register Quality Assurance Limited.

Lloyd's Register LRQA

CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

CDI OILFIELD S.R.L.
7 Piatra Craiului St., Hall 9, Industrial Zone DIBO, Brazi,
Negoiesti Village, 107086, Prahova County
Romania

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards:

ISO 9001:2015

The Quality Management System is applicable to:

Activities related to petroleum and natural gas extraction, manufactures and provides servicing for subsurface sucker rod pumps, PC pumps and related equipment.

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

Approval Certificate No: BUC6020124/1

Original Approval: 24 July 2014
Current Certificate: 26 July 2017
Certificate Expiry: 23 July 2020

Issued by: Lloyd's Register (Romania) S.R.L. for and on behalf of Lloyd's Register Quality Assurance Limited.

Lloyd's Register LRQA

CERTIFICATE OF APPROVAL

This is to certify that the Environmental Management System of:

CDI OILFIELD S.R.L.
7 Piatra Craiului St., Hall 9, Industrial Zone DIBO, Brazi,
Negoiesti Village, 107086, Prahova County
Romania

has been approved by Lloyd's Register Quality Assurance to the following Environmental Management System Standards:

ISO 14001:2015

The Environmental Management System is applicable to:

Activities including and associated with activities related to petroleum and natural gas extraction, manufactures and provides servicing for subsurface sucker rod pumps, PC pumps and related equipment.

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

Approval Certificate No: BUC6020124/2

Original Approval: 24 July 2014
Current Certificate: 26 July 2017
Certificate Expiry: 23 July 2020

Issued by: Lloyd's Register (Romania) S.R.L. for and on behalf of Lloyd's Register Quality Assurance Limited.

API/STANDARD PUMPS

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RHA Rod Pump stationary, heavy wall barrel, top anchor

Description

The CDI RHA pump is a precision, insert rod type with an API B12 heavy wall barrel and either a cup or mechanical top anchor (hold-down).

CDI RHA pumps are available in 1-1/4, 1-1/2, 1-3/4 and 2-1/4 inch bore sizes.

The API B12 heavy wall barrel is externally threaded and has an inside diameter tolerance of +0.002 / -0.000 inches.

The RHA pump assembly is installed in the well on the end of the sucker rod string and seated in the seating nipple installed in the tubing string at a predetermined depth.

ADVANTAGES OF RHA PUMP

Recommended for sandy wells

- The top anchor (hold-down) eliminates sand settling between the pump barrel and tubing on the hold-down contrasted with a bottom anchor pump which can become sanded in and cause a stripping job.
- The fluid is discharged through the guide approximately 3 inches above the hold-down which limits the amount of sand that can settle over the hold-down.
- The top anchor is even better than a traveling barrel bottom anchor pump, since if a traveling barrel pump is spaced too high, sand can settle on the hold-down around the pull tube right up to the lowest point reached by the pull plug on the downstroke.

Recommended for low fluid level, gassy or foamy wells

- The top anchor pump allows the standing valve to be submerged in the fluid being pumped. This allows the fluid level to be pumped down lower below the seating nipple than with a bottom anchor pump.
- The pump barrel can act as a gas anchor in gassy installations.

Recommended for wells with scale or gyp

- The RHA pump barrel assembly consists of the barrel and extension couplings at each end. Proper selection of pump components to match stroke length will allow the plunger to stroke out both ends of the barrel.
- This eliminates gyp or scale forming in the barrel which could prevent removal of the plunger from the barrel.

Recommended for wells requiring long pumps

- The pump barrel hangs down from the top anchor allowing the barrel to align itself in deviated or horizontal wells.

LIMITATIONS OF RHA PUMP

Not recommended for deep wells

- On the downstroke, the fluid load in the tubing is supported by the standing valve and barrel which puts a tensile load on the barrel. This can cause a tensile failure of the extension threads if the pump is too deep.
- The formation or suction pressure around the outside of the barrel is low whereas the pressure due to the fluid load on the downstroke inside the barrel is high. This can cause the barrel to burst if the pump is too deep.
- Should a fluid pound condition exist, the force of the plunger hitting the fluid will create a sudden high pressure inside the barrel. This can also cause the extensions to fail.
- RHA pumps are generally not recommended for depths below 7000 feet. The bore size of the pump, pump barrel material, well conditions and fluid pound, control the setting depth of RHA pumps. These criteria must be considered when determining the setting depth.

Not recommended for intermittent pumping in sandy wells

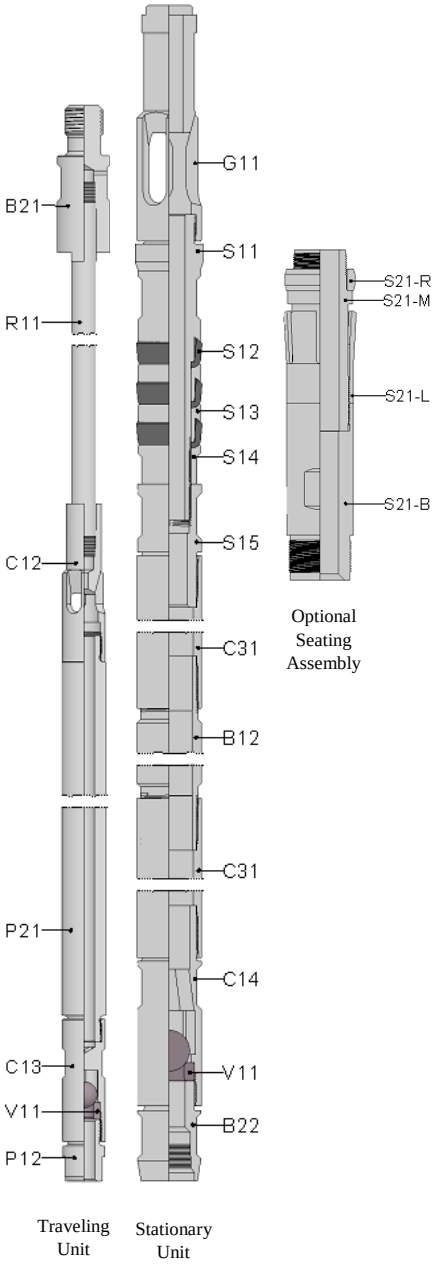
- When the pump is shut down, sand can settle between the inside of the barrel and the outside of the plunger which could lead to the pump sticking.
- The use of a sand check, located in the guide around the valve rod sitting on top of the hold- down mandrel, will prevent sand from settling into the pump thus eliminating this problem.
- When the pump is shut down, the plunger assembly should be at the top of the upstroke. When the pump is turned on, it is easier for the plunger to fall should there be any sand accumulation. If the plunger assembly was at the bottom of the downstroke, the sand accumulation could cause a sticking problem.

Tubing erosion opposite top guide

- Fluid flow out of the port of the guide can impinge against the tubing and cause erosion and possible tubing leak or failure.
- Guides having multiple ports directed upward will cause fluid flow up the tubing rather than impinging on the tubing I.D.
- A hollow tube pump can be used which eliminates fluid flow out of the stationary guide and allows fluid flow out of the traveling cage/coupling on top of the pull tube through the stroking of the pump.

Line-up RHA

Component Type	Description	Part Symbol			
		Tubing Size and Pump Bore (inches)			
		2-3/8 1-1/4	2-7/8 1-1/2	2-7/8 1-3/4	3-1/2 2-1/4
Traveling Unit					
B21	Bushing, Valve Rod	B21-20-XXXX	B21-25-XXXX	B21-25-XXXX	B21-30-XXXX
R11	Rod, Valve[1]	R11-20-XXXX	R11-25-XXXX	R11-25-XXXX	R11-30-XXXX
C12	Cage, Open, Top Plunger	C12-125-XXXX	C12-150-25-XXXX	C12-175-XXXX	C12-225-XXXX
P21	Plunger, Pin End 1,2	P21-125-XXXX	P21-150-XXXX	P21-175-XXXX	P21-225-XXXX
C13	Cage, Closed Plunger	C13-125-XXXX	C13-150-XXXX	C13-175-XXXX	C13-225-XXXX
V11	Valve, Ball and Seat	V11-125-XXXX	V11-150-XXXX	V11-175-XXXX	V11-225-XXXX
P12	Plug, Seat Retainer	P12-125-XXXX	P12-150-XXXX	P12-175-XXXX	P12-225-XXXX
Stationary Unit					
G11	Guide, Valve Rod	G11-20-XXXX	G11-25-XXXX	G11-25-XXXX	G11-30-XXXX
C31	Coupling, Extension[3] (x2)	C31-125-XXXX	C31-150-XXXX	C31-175-XXXX	C31-225-XXXX
B12	Barrel, Heavy Wall[1]	B12-125-XXXX	B12-150-XXXX	B12-175-XXXX	B12-225-XXXX
C14	Cage, Closed Barrel	C14-20-XXXX	C14-25-XXXX	C14-25-XXXX	C14-30-XXXX
V11	Valve, Ball and Seat	V11-175-XXXX	V11-225-XXXX	V11-225-XXXX	V11-250-XXXX
B22	Bushing, Barrel Cage	B22-20-XXXX	B22-25-XXXX	B22-25-XXXX	B22-30-XXXX
Standard Seating Assembly (RHAC Pump)					
S10	API 3-Cup, Type HR[4]	S10-20-XXXX	S10-25-XXXX	S10-25-XXXX	S10-30-XXXX
S15	Bushing, Seating Cup	S15-20-XXXX	S15-25-XXXX	S15-25-XXXX	S15-30-XXXX
Seating Nipple (not shown or included in assembly)					
N11	Nipple, Seating, Cup[5]	N11-20-XXXX	N11-25-XXXX	N11-25-XXXX	N11-30-XXXX
Optional Seating Assembly (RHAM Pump)					
S21	API Mechanical Top Lock[6]	S21-20-XXXX	S21-25-XXXX	S21-25-XXXX	S21-30-XXXX
Seating Nipple (not shown or included in assembly)					
N14	Nipple, Seating,Mechanic	N14-20-XXXX	N14-25-XXXX	N14-25-XXXX	N14-30-XXXX



1 Add -LL for length in feet for plunger, barrel and valve rod

2 Add -FF for fit in thousandths of an inch for plunger

3 Add -LL for length in inches for coupling extensions

4 Add -SSS for cup size for 3-cup seating assembly. S10 contains S11, S12, S13, S14

5 Add -012 for nipple length

6 Add -ASM to part symbol to indicate assembly. ASM contains S21-M, S21-R, S21-L, S21-B

(x2) Component required twice

Notes

- When a cup hold-down is used, the pump is a type RHAC.
- When a mechanical hold-down is used, the pump is a type RHAM.
- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.

RHB Rod Pump stationary, heavy wall barrel, bottom anchor

Description

The CDI RHB pump is a precision, insert rod type with an API B12 heavy wall barrel and either a cup or mechanical bottom anchor (hold-down).

CDI RHB pumps are available in 1-1/4, 1-1/2, 1-3/4 and 2-1/4 inch bore sizes.

The API B12 heavy wall barrel is externally threaded and has an inside diameter tolerance of +0.002 / -0.000 inches.

The RHB pump assembly is installed in the well on the end of the sucker rod string and seated in the seating nipple installed in the tubing string at a predetermined depth.

ADVANTAGES OF RHB PUMP

Recommended for deep wells

- Pressure due to fluid load in the tubing acts on the O.D. of the barrel and the I.D. of the barrel above the plunger.
- This balanced pressure around the barrel overcomes the disadvantages of a top anchor (hold-down) pump; that is, tensile loading on the barrel during downstroke and potential for the barrel to burst due to internal pressure or fluid pound.

Recommended for wells with low fluid level

- Fluid has only to pass through the anchor and standing valve to be in the producing chamber of the pump.

Recommended for wells with scale or gyp

- The RHB pump barrel assembly consists of the barrel and extension couplings at each end. Proper selection of pump components to match stroke length will allow the plunger to stroke out both ends of the barrel.
- This eliminates gyp or scale forming in the barrel which could prevent removal of the plunger from the barrel.

LIMITATIONS OF RHB PUMP

Not recommended for sandy wells

- Sand can settle on the bottom anchor between the O.D. of the barrel and the I.D. of the tubing. This can cause the pump to be sanded in which could lead to pulling a "wet string" to remove the pump.
- A top seal assembly can be run on top of a bottom anchor pump to eliminate sand settling on the bottom anchor. The top seal assembly is run between the guide and the top of the barrel and seals (or packs off) the annulus between the tubing I.D. and the barrel O.D.

Barrel subject to corrosive attack

- Corrosive fluid will be stagnant between the tubing I.D. and the barrel O.D. causing corrosion to attack the outside of the barrel.
- A bottom discharge valve can be installed on the lower end of the barrel. This allows a portion of the produced fluid to be discharged into the annulus between the tubing I.D. and the barrel O.D. This keeps the fluid in motion preventing corrosive attack on the barrel O.D. due to stagnant corrosive fluid. This also aids in keeping sand from settling on the bottom anchor.

Not recommended for intermittent pumping in sandy wells

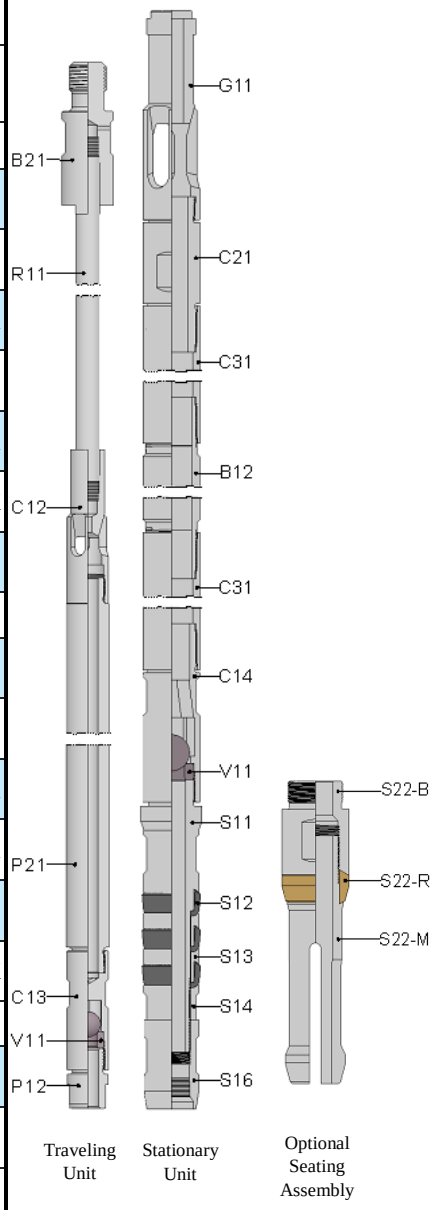
- When the pump is shut down, sand can settle between the inside of the barrel and the outside of the plunger which could lead to pump sticking.
- The use of a sand check, located in the guide around the valve rod sitting on top of the connector, will prevent sand from settling into the pump thus eliminating this problem.
- When the pump is shut down, the plunger assembly should be at the top of the upstroke. When the pump is turned on, it is easier for the plunger to fall should there be any sand accumulation. If the plunger assembly was at the bottom of the downstroke, the sand accumulation could cause a sticking problem

Tubing erosion opposite top guide

- Fluid flow out of the port of the guide can impinge against the tubing and cause erosion and possible tubing leak or failure.
- Guides having multiple ports directed upward will cause fluid flow up the tubing rather than impinging on the tubing I.D.
- A hollow tube pump can be used which eliminates fluid flow out of the stationary guide and allows fluid flow out of the traveling cage/coupling on top of the pull tube through the stroking of the pump.

Line-up RHB

Component Type	Description	Part Symbol			
		Tubing Size and Pump Bore (inches)			
		2-3/8 1-1/4	2-7/8 1-1/2	2-7/8 1-3/4	3-1/2 2-1/4
Traveling Unit					
B21	Bushing, Valve Rod	B21-20-XXXX	B21-25-XXXX	B21-25-XXXX	B21-30-XXXX
R11	Rod, Valve[1]	R11-20-XXXX	R11-25-XXXX	R11-25-XXXX	R11-30-XXXX
C12	Cage, Open, Top Plunger	C12-125-XXXX	C12-150-25-XXXX	C12-175-XXXX	C12-225-XXXX
P21	Plunger, Pin End 1,2	P21-125-XXXX	P21-150-XXXX	P21-175-XXXX	P21-225-XXXX
C13	Cage, Closed Plunger	C13-125-XXXX	C13-150-XXXX	C13-175-XXXX	C13-225-XXXX
V11	Valve, Ball and Seat	V11-125-XXXX	V11-150-XXXX	V11-175-XXXX	V11-225-XXXX
P12	Plug, Seat Retainer	P12-125-XXXX	P12-150-XXXX	P12-175-XXXX	P12-225-XXXX
Stationary Unit					
G11	Guide, Valve Rod	G11-20-XXXX	G11-25-XXXX	G11-25-XXXX	G11-30-XXXX
C21	Connector, Barrel	C21-20-XXXX	C21-25-XXXX	C21-25-XXXX	C21-30-XXXX
C31	Coupling, Extension[3] (x2)	C31-125-XXXX	C31-150-XXXX	C31-175-XXXX	C31-225-XXXX
B12	Barrel, Heavy Wall[1]	B12-125-XXXX	B12-150-XXXX	B12-175-XXXX	B12-225-XXXX
C14	Cage, Closed Barrel	C14-20-XXXX	C14-25-XXXX	C14-25-XXXX	C14-30-XXXX
V11	Valve, Ball and Seat	V11-175-XXXX	V11-225-XXXX	V11-225-XXXX	V11-250-XXXX
Standard Seating Assembly (RHBC Pump)					
S10	API 3-Cup, Type HR[4]	S10-20-XXXX	S10-25-XXXX	S10-25-XXXX	S10-30-XXXX
S16	Coupling, Seating Cup	S16-20-XXXX	S16-25-XXXX	S16-25-XXXX	S16-30-XXXX
Seating Nipple (not shown or included in assembly)					
N11	Nipple, Seating, Cup[5]	N11-20-XXXX	N11-25-XXXX	N11-25-XXXX	N11-30-XXXX
Optional Seating Assembly (RHBM Pump)					
S22	API Mechanical Btm Lock[6]	S22-20-XXXX	S22-25-XXXX	S22-25-XXXX	S22-30-XXXX
Seating Nipple (not shown or included in assembly)					
N12	Nipple, Seating, Mechanical	N12-20-XXXX	N12-25-XXXX	N12-25-XXXX	N12-30-XXXX



1 Add -LL for length in feet for plunger, barrel and valve rod

2 Add -FF for fit in thousandths of an inch for plunger

3 Add -LL for length in inches for coupling extensions

4 Add -SSS for cup size for 3-cup seating assembly. S10 contains S11, S12, S13, S14

5 Add -012 for nipple length

6 Add -ASM to part symbol to indicate assembly. ASM contains S22-R, S22-M, S22-B

(x2) Component required twice

Notes

- When a cup hold-down is used, the pump is a type RHBC.
- When a mechanical hold-down is used, the pump is a type RHBM.
- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.

RWA Rod Pump stationary, thin wall barrel, top anchor

Description

The CDI RHA pump is a precision, insert rod type with an API B11 thin wall barrel and either a cup or mechanical top anchor (hold-down).

CDI RWA pumps are available in 1-1/2, 2 and 2-1/2 inch bore sizes.

The API B11 thin wall barrel is internally threaded and has an inside diameter tolerance of +0.002 / -0.000 inches.

The RWA pump assembly is installed in the well on the end of the sucker rod string and seated in the seating nipple installed in the tubing string at a predetermined depth.

ADVANTAGES OF RHA PUMP

Recommended for sandy wells

- The top anchor (hold-down) eliminates sand settling between the pump barrel and tubing on the hold-down contrasted with a bottom anchor pump which can become sanded in and cause a stripping job.
- The fluid is discharged through the guide approximately 3 inches above the hold-down which limits the amount of sand that can settle over the hold-down.
- The top anchor is even better than a traveling barrel bottom anchor pump, since if a traveling barrel pump is spaced too high, sand can settle on the hold-down around the pull tube right up to the lowest point reached by the pull plug on the downstroke.

Recommended for low fluid level, gassy or foamy wells

- The top anchor pump allows the standing valve to be submerged in the fluid being pumped. This allows the fluid level to be pumped down lower below the seating nipple than with a bottom anchor pump.
- The pump barrel can act as a gas anchor in gassy installations.

Recommended for wells requiring long pumps

- The pump barrel hangs down from the top anchor allowing the barrel to align itself in deviated or horizontal wells.

LIMITATIONS OF RHA PUMP

Not recommended for deep wells

- On the downstroke, the fluid load in the tubing is supported by the standing valve and barrel which puts a tensile load on the barrel. This can cause a tensile failure of the extension threads if the pump is too deep.
- The formation or suction pressure around the outside of the barrel is low whereas the pressure due to the fluid load on the downstroke inside the barrel is high. This can cause the barrel to burst if the pump is too deep.
- Should a fluid pound condition exist, the force of the plunger hitting the fluid will create a sudden high pressure inside the barrel. This can also cause the extensions to fail.
- RWA pumps are generally not recommended for depths below 5000 feet. The bore size of the pump, pump barrel material, well conditions and fluid pound, control the setting depth of RWA pumps. These criteria must be considered when determining the setting depth.

Not recommended for intermittent pumping in sandy wells

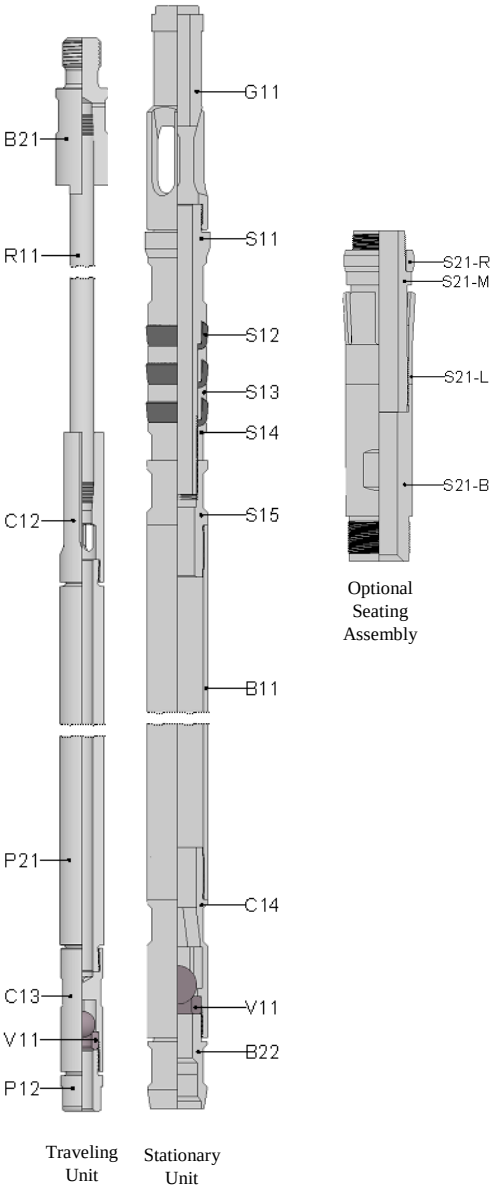
- When the pump is shut down, sand can settle between the inside of the barrel and the outside of the plunger which could lead to the pump sticking.
- The use of a sand check, located in the guide around the valve rod sitting on top of the hold- down mandrel, will prevent sand from settling into the pump thus eliminating this problem.
- When the pump is shut down, the plunger assembly should be at the top of the upstroke. When the pump is turned on, it is easier for the plunger to fall should there be any sand accumulation. If the plunger assembly was at the bottom of the downstroke, the sand accumulation could cause a sticking problem.

Tubing erosion opposite top guide

- Fluid flow out of the port of the guide can impinge against the tubing and cause erosion and possible tubing leak or failure.
- Guides having multiple ports directed upward will cause fluid flow up the tubing rather than impinging on the tubing I.D.
- A hollow tube pump can be used which eliminates fluid flow out of the stationary guide and allows fluid flow out of the traveling cage/coupling on top of the pull tube through the stroking of the pump.

Line-up RWA

Component Type	Description	Part Symbol		
		Tubing Size and Pump Bore (inches)		
		2-3/8 1-1/2	2-7/8 2	3-1/2 2-1/2
Traveling Unit				
B21	Bushing, Valve Rod	B21-20-XXXX	B21-25-XXXX	B21-30-XXXX
R11	Rod, Valve[1]	R11-20-XXXX	R11-25-XXXX	R11-30-XXXX
C12	Cage, Open, Top Plunger	C12-150-20-XXXX	C12-200-XXXX	C12-250-XXXX
P21	Plunger, Pin End[1,2]	P21-150-XXXX	P21-200-XXXX	P21-250-XXXX
C13	Cage, Closed Plunger	C13-150-XXXX	C13-200-XXXX	C13-250-XXXX
V11	Valve, Ball and Seat	V11-150-XXXX	V11-200-XXXX	V11-250-XXXX
P12	Plug, Seat Retainer	P12-150-XXXX	P12-200-XXXX	P12-250-XXXX
Stationary Unit				
G11	Guide, Valve Rod	G11-20-XXXX	G11-25-XXXX	G11-30-XXXX
B11	Barrel, Thin Wall[1]	B11-150-XXXX	B11-200-XXXX	B11-250-XXXX
C14	Cage, Closed Barrel	C14-20-XXXX	C14-25-XXXX	C14-30-XXXX
V11	Valve, Ball and Seat	V11-175-XXXX	V11-225-XXXX	V11-250-XXXX
B22	Bushing, Barrel Cage	B22-20-XXXX	B22-25-XXXX	B22-30-XXXX
Standard Seating Assembly (RWAC Pump)				
S10	API 3-Cup, Type HR[3]	S10-20-XXXX	S10-25-XXXX	S10-30-XXXX
S15	Bushing, Seating Cup	S15-20-XXXX	S15-25-XXXX	S15-30-XXXX
Seating Nipple (not shown or included in assembly)				
N11	Nipple, Seating, Cup[4]	N11-20-XXXX	N11-25-XXXX	N11-30-XXXX
Optional Seating Assembly (RWAM Pump)				
S21	API Mechanical Top Lock[5]	S21-20-XXXX	S21-25-XXXX	S21-30-XXXX
Seating Nipple (not shown or included in assembly)				
N14	Nipple, Seating,Mechanical	N14-20-XXXX	N14-25-XXXX	N14-30-XXXX



1 Add -LL for length in feet for plunger, barrel and valve rod

2 Add -FF for fit in thousandths of an inch for plunger

3 Add -SSS for cup size for 3-cup seating assembly. S10 contains S11, S12, S13, S14

4 Add -012 for nipple length

5 Add -ASM to part symbol to indicate assembly. ASM contains S21-M, S21-R, S21-L, S21-B

Notes

- When a cup hold-down is used, the pump is a type RWAC.
- When a mechanical hold-down is used, the pump is a type RWAM.
- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.

RWB Rod Pump stationary, thin wall barrel, bottom anchor

Description

The CDI RWB pump is a precision, insert rod type with an API B11 thin wall barrel and either a cup or mechanical bottom anchor (hold-down).

CDI RWB pumps are available in 1-1/2, 2 and 2-1/2 inch bore sizes.

The API B11 thin wall barrel is internally threaded and has an inside diameter tolerance of +0.002 / -0.000 inches.

The RWB pump assembly is installed in the well on the end of the sucker rod string and seated in the seating nipple installed in the tubing string at a predetermined depth.

ADVANTAGES OF RHB PUMP

Recommended for deep wells

- Pressure due to fluid load in the tubing acts on the O.D. of the barrel and the I.D. of the barrel above the plunger.
- This balanced pressure around the barrel overcomes the disadvantages of a top anchor (hold-down) pump; that is, tensile loading on the barrel during downstroke and potential for the barrel to burst due to internal pressure or fluid pound.

Recommended for wells with low fluid level

- Fluid has only to pass through the anchor and standing valve to be in the producing chamber of the pump.

LIMITATIONS OF RHB PUMP

Not recommended for sandy wells

- Sand can settle on the bottom anchor between the O.D. of the barrel and the I.D. of the tubing. This can cause the pump to be sanded in which could lead to pulling a "wet string" to remove the pump.
- A top seal assembly can be run on top of a bottom anchor pump to eliminate sand settling on the bottom anchor. The top seal assembly is run between the guide and the top of the barrel and seals (or packs off) the annulus between the tubing I.D. and the barrel O.D.

Barrel subject to corrosive attack

- Corrosive fluid will be stagnant between the tubing I.D. and the barrel O.D. causing corrosion to attack the outside of the barrel.
- A bottom discharge valve can be installed on the lower end of the barrel. This allows a portion of the produced fluid to be discharged into the annulus between the tubing I.D. and the barrel O.D. This keeps the fluid in motion preventing corrosive attack on the barrel O.D. due to stagnant corrosive fluid. This also aids in keeping sand from settling on the bottom anchor.

Not recommended for intermittent pumping in sandy wells

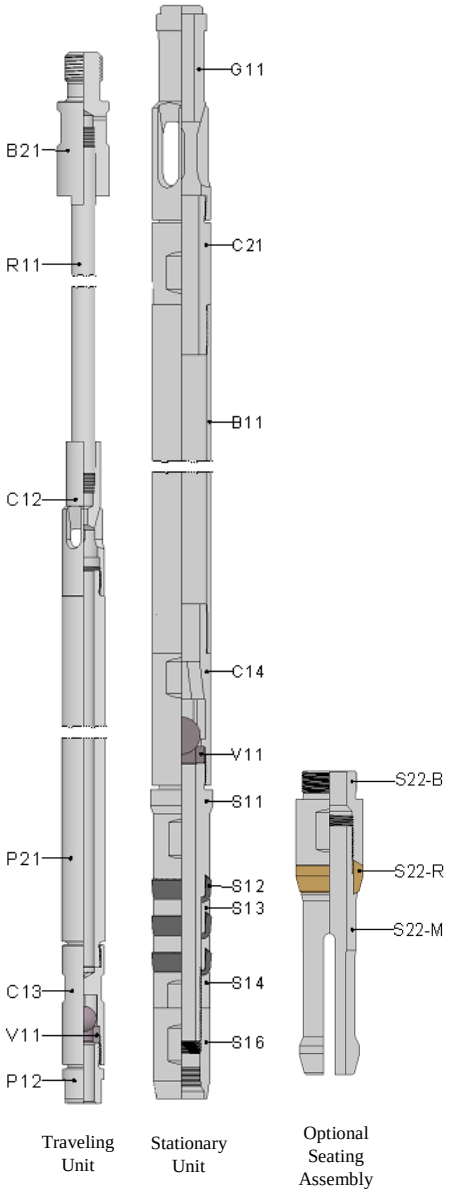
- When the pump is shut down, sand can settle between the inside of the barrel and the outside of the plunger which could lead to pump sticking.
- The use of a sand check, located in the guide around the valve rod sitting on top of the connector, will prevent sand from settling into the pump thus eliminating this problem.
- When the pump is shut down, the plunger assembly should be at the top of the upstroke. When the pump is turned on, it is easier for the plunger to fall should there be any sand accumulation. If the plunger assembly was at the bottom of the downstroke, the sand accumulation could cause a sticking problem

Tubing erosion opposite top guide

- Fluid flow out of the port of the guide can impinge against the tubing and cause erosion and possible tubing leak or failure.
- Guides having multiple ports directed upward will cause fluid flow up the tubing rather than impinging on the tubing I.D.
- A hollow tube pump can be used which eliminates fluid flow out of the stationary guide and allows fluid flow out of the traveling cage/coupling on top of the pull tube through the stroking of the pump.

Line-up RWB

Component Type	Description	Part Symbol		
		Tubing Size and Pump Bore (inches)		
		2-3/8 1-1/2	2-7/8 2	3-1/2 2-1/2
Traveling Unit				
B21	Bushing, Valve Rod	B21-20-XXXX	B21-25-XXXX	B21-30-XXXX
R11	Rod, Valve[1]	R11-20-XXXX	R11-25-XXXX	R11-30-XXXX
C12	Cage, Open, Top Plunger	C12-150-20-XXXX	C12-200-XXXX	C12-250-XXXX
P21	Plunger, Pin End[1,2]	P21-150-XXXX	P21-200-XXXX	P21-250-XXXX
C13	Cage, Closed Plunger	C13-150-XXXX	C13-200-XXXX	C13-250-XXXX
V11	Valve, Ball and Seat	V11-150-XXXX	V11-200-XXXX	V11-250-XXXX
P12	Plug, Seat Retainer	P12-150-XXXX	P12-200-XXXX	P12-250-XXXX
Stationary Unit				
G11	Guide, Valve Rod	G11-20-XXXX	G11-25-XXXX	G11-30-XXXX
B11	Barrel, Thin Wall[1]	B11-150-XXXX	B11-200-XXXX	B11-250-XXXX
C21	Connector, Barrel	C21-20-XXXX	C21-25-XXXX	C21-30-XXXX
C14	Cage, Closed Barrel	C14-20-XXXX	C14-25-XXXX	C14-30-XXXX
V11	Valve, Ball and Seat	V11-175-XXXX	V11-225-XXXX	V11-250-XXXX
Standard Seating Assembly (RWBC Pump)				
S10	API 3-Cup, Type HR[3]	S10-20-XXXX	S10-25-XXXX	S10-30-XXXX
S16	Coupling, Seating Cup	S16-20-XXXX	S16-25-XXXX	S16-30-XXXX
Seating Nipple (not shown or included in assembly)				
N11	Nipple, Seating, Cup[4]	N11-20-XXXX	N11-25-XXXX	N11-30-XXXX
Optional Seating Assembly (RWBM Pump)				
S22	API Mechanical Btm Lock [5]	S22-20-XXXX	S22-25-XXXX	S22-30-XXXX
Seating Nipple (not shown or included in assembly)				
N12	Nipple, Seating,Mechanical	N12-20-XXXX	N12-25-XXXX	N12-30-XXXX



1 Add -LL for length in feet for plunger, barrel and valve rod

2 Add -FF for fit in thousandths of an inch for plunger

3 Add -SSS for cup size for 3-cup seating assembly. S10 contains S11, S12, S13, S14

4 Add -012 for nipple length

5 Add -ASM to part symbol to indicate assembly. ASM contains S22-R, S22-M, S22-B

Notes

- When a cup hold-down is used, the pump is a type RWBC.
- When a mechanical hold-down is used, the pump is a type RWBM.
- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.

TH Tubing, Heavy wall barrel pump

Description

The CDI TH pump is built to move the maximum amount of fluid. It is a precision tubing type with an API B13 heavy wall barrel and either a cup or mechanical seating assembly on the retrievable standing valve assembly. Either a "tap type" or "sure hold" puller on the bottom of the plunger assembly is used to retrieve the standing valve assembly.

CDI TH pumps are available in 1-3/4, 2-1/4, 2-3/4 and 3-3/4 inch bore sizes.

The API B13 heavy wall barrel is externally threaded and has an inside diameter tolerance of + 0.002 / - 0.000 inches.

The barrel assembly, including the seating nipple, is a part of the tubing string and run with the tubing. The plunger assembly, including the standing valve unit, is run in the well on the end of the sucker rod string. If the standing valve unit is not run in with the plunger assembly by means of the puller, then it can be seated in the seating nipple and run with the barrel assembly.

ADVANTAGES OF TH PUMP

Large capacity

- The TH pump has the largest bore size in any given size tubing.
- The bore size is just 0.250 inches smaller than the normal tubing I.D.
- It produces a greater volume of fluid than insert rod pumps due to the large bore size.
- Large fluid flow areas through the standing and travelling valves make the TH pump good for producing heavy, viscous fluid.

Strong construction

- The heavy wall barrel connects directly to the tubing string.
- The sucker rod string connects directly to the top plunger cage of the plunger assembly.

LIMITATIONS OF TH PUMP

Pull tubing to replace barrel

- Since the TH barrel is installed in the tubing string, the only way to replace the barrel is to pull the tubing.
- Selection of the best barrel for an installation is very important as it may save a tubing job.

Not recommended for gassy wells

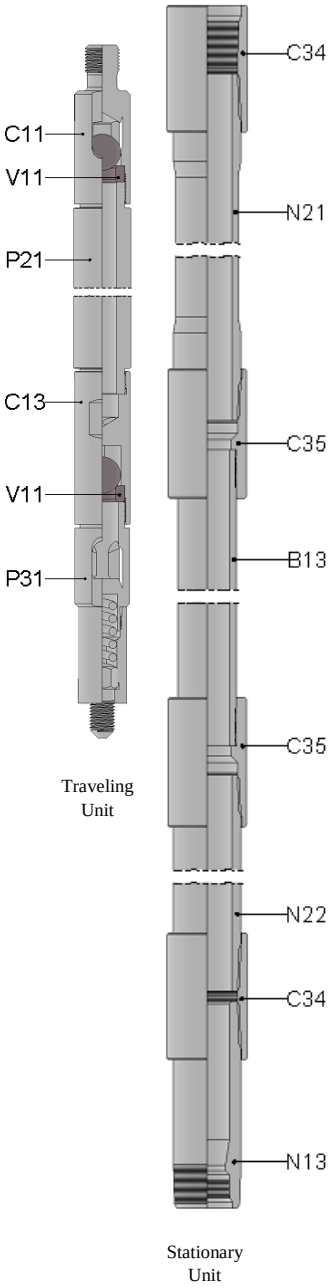
- Gas compression ratios very low in TH pumps due to unswept volume at the bottom of the stroke.
- Length of standing valve assembly, the puller on the bottom of the plunger assembly and the I.D. of the extension nipple contribute to large unswept volume at the bottom of the pump.
- This unswept volume can be reduced by eliminating the extension nipple at the bottom of the pump and connecting the barrel directly to the seating nipple with the barrel coupling.

Not recommended for deep wells

- Large bore increases fluid load on the sucker rod string.
- Increased fluid load will increase stroke loss due to rod and tubing stretch. As the pump is set deeper this stroke loss may result in lower production than could be obtained with an insert rod pump.
- Generally, TH pumps are not recommended for depths below 5000 feet.

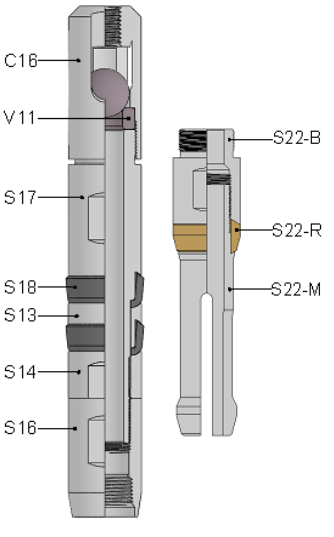
Line-up TH

Component Type	Description	Part Symbol			
		Tubing Size and Pump Bore (inches)			
		2-3/8 1-3/4	2-7/8 2-1/4	3-1/2 2-3/4	4-1/2 3-3/4
Traveling Unit					
C11	Cage, Open top	C11-20-XXXX	C11-25-XXXX	C11-30-XXXX	C11-40-XXXX
V11	Valve, Ball and Seat (x2)	V11-175-XXXX	V11-225-XXXX	V11-250-XXXX	V11-375-XXXX
P21	Plunger, One Piece[1,2]	P21-175-XXXX	P21-225-XXXX	P21-275-XXXX	P21-375-XXXX
C13	Cage, Closed Plunger	C13-175-XXXX	C13-225-XXXX	C13-275-XXXX	C13-375-XXXX
P31	Puller, Standing Valve, Tap Type	P31-175-XXXX	P31-225-XXXX	P31-275-XXXX	P31-375-XXXX[6]
Stationary Unit					
C34	Coupling, Tubing (x2)	C34-20-XXXX	C34-25-XXXX	C34-30-XXXX	C34-40-XXXX
N21	Nipple, Extension Upper[4]	N21-20-XXXX	N21-25-XXXX	N21-30-XXXX	N21-40-XXXX
C35	Coupling, Barrel (x2)	C35-20-XXXX	C35-25-XXXX	C35-30-XXXX	C35-40-XXXX
B13	Barrel, Heavy Wall[1]	B13-175-XXXX	B13-225-XXXX	B13-275-XXXX	B13-375-XXXX
N22	Nipple, Extension Lower[4]	N22-20-XXXX	N22-25-XXXX	N22-30-XXXX	N22-40-XXXX
Cup Type, Seating Assembly (THC Pump)					
C16	Cage, Standing Valve	C16-175-XXXX	C16-225-XXXX	C16-275-XXXX	C16-375-XXXX
V11	Valve, Ball and Seat	V11-175-XXXX	V11-225-XXXX	V11-250-XXXX	V11-375-XXXX
S10	API 2-Cup, Type HR[3]	S10T20-XXXX	S10T25-XXXX	S10T30-XXXX	-
S16	Coupling, Seating Cup	S16-20-XXXX	S16-25-XXXX	S16-30-XXXX	-
Cup Type, Seating Nipple					
N13	Nipple, Seating, Cup	N13-20-XXXX	N13-25-XXXX	N13-30-XXXX	-
Mechanical type, Seating Assembly (THM Pump)					
S22	API Mechanical Btm Lock[5]	-	-	-	S22-40-XXXX
Mechanical type, Seating Nipple (not shown)					
N12	Nipple, Seating, Mechanical	-	-	-	N12-40-XXXX



Traveling Unit

Stationary Unit



Cup Type, Seating Assembly

Mech. Type, Seating Assembly

1 Add -LL for length in feet for plunger, barrel

2 Add -FF for fit in thousandths of an inch for plunger

3 Add -SSS for cup size for 2-cup seating assembly. S10T contains S17, S18, S13, S14

4 Add -LL for length in inches for nipple extensions

5 Add -ASM to part symbol to indicate assembly. ASM contains S22-R, S22-M, S22-B

6 P31-275 can be used instead by using optional B23-40 crossover bushing

Notes

- When a cup hold-down is used, the pump is a type THC.
- When a mechanical hold-down is used, the pump is a type THM.
- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.

SPECIALTY PUMPS

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MHT- McGiver Pump

Description

The CDI MHT-McGiver pump is a travelling-barrel pump designed for use in wells where abrasive and gaseous fluids are produced. The McGiver utilizes a shorter, traveling, heavy wall barrel and a barrel jacket.

MHT pumps are available in 1-1/4, 1-1/2 and 1-3/4 inch bore sizes.

The CDI MHT-McGiver pump assembly is installed in the well on the end of the sucker rod string and seated in the seating nipple installed in the tubing string at a predetermined depth.

This pump is available in both Hold down type: API cups or API mechanical.

ADVANTAGES OF MHT PUMP

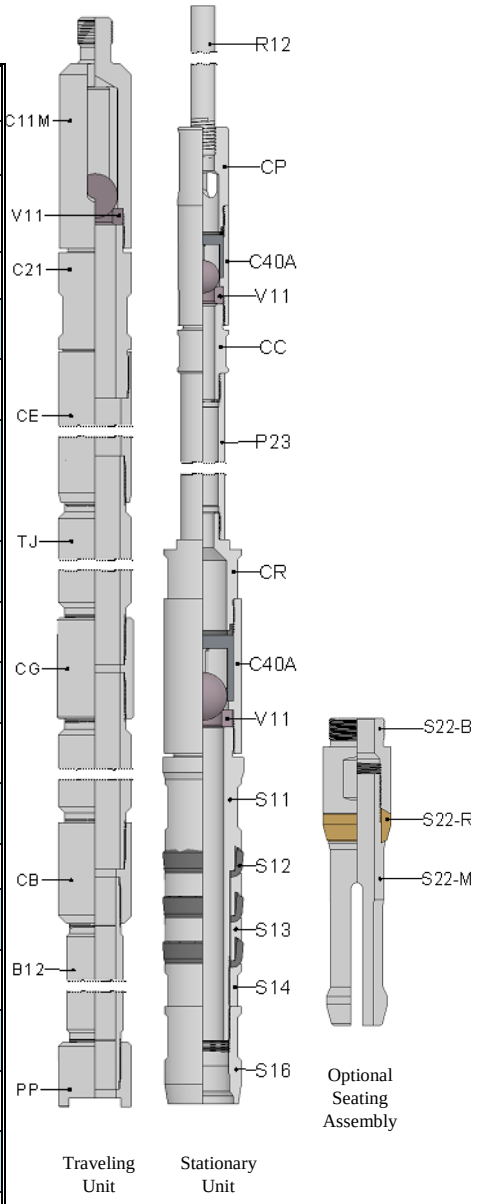
- The pump prevents sand or foreign material from settling on top or around the plunger and sticking it in the barrel because has a long smooth plunger that extends through a short barrel. Due to the length of the plunger, the ends do not enter in barrel section at either the top or bottom of the stroke. The plunger is wiped clean on each stroke, and foreign material (sand) is not carried into the barrel.
- The traveling valve is located at the top of the traveling assembly. This acts as a check valve, and keeps foreign material from entering the pump, and when the pumping cycle is in “shut down” mode.
- The McGiver utilizes a lower standing valve or “Foot Valve”, installed between the hold down and plunger. This design maintains fluid loading in the plunger. This minimizes the distance the fluid must travel from the wellbore into the pump.
- The pump uses a long plunger which gives a stronger construction for standing assembly.
- Pressure due to fluid load in the tubing acts on the O.D. of the barrel. This balanced pressure around the barrel overcomes the disadvantages of a top anchor pump.
- To prevent premature failure of the barrel assembly, which will loose material by friction with tubing, shorter jackets have been used together with special wear resistant coupling.

LIMITATIONS OF MHT PUMP

- Even though the design does not promote good compression ratios, this disadvantage is compensated for with the “ball knocker” or “ball lifting” device. This device physically lifts the traveling valve ball off the seat, at the bottom of the “down stroke”, allowing compressed gas to escape up the production tubing.

Line-up MHT

Component Type	Description	Part Symbol Tubing Size and Pump Bore (inches) 2-7/8 1-1/4	2-7/8 1-1/2	3-1/2 1-3/4
Traveling Unit				
C11M	Cage, Top Open	C11M25-XXXX	C11M25-XXXX	C11M30-XXXX
V11	Valve, Ball and Seat	V11-225-XXXX	V11-225-XXXX	V11-250-XXXX
C21	Connector, Barrel	C21-25-XXXX	C21-25-XXXX	M65-C54-115-XXXX
CE	Coupling, Extension[3]	C31-150-XXXX	C31-175-XXX	
TJ	Tube, Jacket (x2 or x3), 4 ft	TJ-150-XXXX	TJ-175-XXX	TJ-225-XXXX
CG	Coupling, Guide (x1 or x2)	CG-150-XXXX	CG-175-XXXX	CG-225-XXXX
CB	Coupling, RH Barrel	M47-M39-101-XXXX	C31-150-XXXX	M65-M53-101-XXXX
B12	Barrel, Heavy Wall, 4 ft	B12-125	B12-150	B12-175
PP	Plug, Pull, Box	M39-50	M46-65	M53-80
Stationary Unit				
R12	Bar, Round, One End Threaded	R12-20-XXXX	R12-25-XXXX	R12-25-XXXX
CP	Cage Open, Top Plunger, 4PC Cge	C31-M15-127-XXXX	C46-175-XXXX	C46-225-XXXX
C40A	Body, 4PC Cage	C40A150-XXXX	C40A175-XXXX	C40A225-XXXX
V11	Valve, Ball and Seat	V11-150-XXXX	V11-175-XXXX	V11-225-XXXX
CC	Connector, Cage to BE Plunger	C31-C25-63-XXXX	C37-C31-80-XXXX	C46-C38-85-XXXX
P23	Plunger, Box End[1,2]	P23-125-XXXX	P23-150-XXXX	P23-175-XXXX
CR	Conn, 4PC Clsd Cge, BE Plg	C45-C25-70-XXXX	C45-C31-85-XXXX	C57-C38-100-XXXX
C40A	Body, 4PC Cage	C40A225-XXXX	C40A225-XXXX	C40A250-XXXX
V11	Valve, Ball and Seat	V11-225-XXXX	V11-225-XXXX	V11-250-XXXX
Standard Seating Assembly (MHTC Pump)				
S10	API 3-Cup, Type HR[4]	S10-25-XXXX	S10-25-XXXX	S10-30-XXXX
S16	Coupling, Seating Cup	S16-25-XXXX	S16-25-XXXX	S16-30-XXXX
Seating Nipple (not shown or included in assembly)				
N11	Nipple, Seating, Cup[5]	N11-25-XXXX	N11-25-XXXX	N11-30-XXXX
Optional Seating Assembly (MHTM Pump)				
S22	API Mechanical Btm Lock[6]	S22-25-XXXX	S22-25-XXXX	S22-30-XXXX
Seating Nipple (not shown or included in assembly)				
N12	Nipple, Seating, Mechanical	N12-25-XXXX	N12-25-XXXX	N12-30-XXXX



1 Add -LL for length in feet for plunger,

2 Add -FF for fit in thousandths of an inch for plunger

3 Length of coupling extension shall be established based on pump length;

4 Add -SSS for cup size for 3-cup seating assembly. S10 contains S11, S12, S13, S14

5 Add -012 for nipple length

6 Add ASM to part symbol to indicate assembly. ASM contains S22-M, S22-R, S22-B

Notes

- When a cup hold-down is used, the pump is a type MHTC.
- When a mechanical hold-down is used, the pump is a type MHTM.
- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.
- C40A is a 4pc cage assembly. See specific pump parts section.

SWAF, Circle A Pump, Top Anchor

Description

The CDI SWAF pump is a precision, insert rod type with an API B11 thin wall barrel and a friction ring top hold-down.

CDI SWAF pumps are available in 2, and 2-1/2 inch bore sizes.

The API B11 thin wall barrel is internally threaded and has an inside diameter tolerance of +0.002 / -0.000 inches.

The SWAF pump assembly is installed in the well on the end of the sucker rod string and seated in the seating nipple installed in the tubing string at a predetermined depth.

The Circle A pump was designed for maximum flow, minimum turbulence and maximum efficiency. Close spacing of the travelling and standing valves allows maximum filling of the pump chamber and maintains a minimum dead volume between the valves. Circle A Pumps are held in place by a unique friction ring hold-down. The friction ring hold-down is short, has maximum flow area and is simple in construction. The force needed to seat the friction ring is determined by the well depth and weight of the sucker rod string.

ADVANTAGES OF SWAF PUMP

Recommended for sandy wells

- The top anchor (hold-down) eliminates sand settling between the pump barrel and tubing on the hold-down contrasted with a bottom anchor pump which can become sanded in and cause a stripping job.

Recommended for wells with low fluid level

- Fluid has only to pass through the anchor and standing valve to be in the producing chamber of the pump.

Recommended for low fluid level, gassy or foamy wells

- The top anchor pump allows the standing valve to be submerged in the fluid being pumped. This allows the fluid level to be pumped down lower below the seating nipple than with a bottom anchor pump.
- The pump barrel can act as a gas anchor in gassy installations.

Recommended for wells requiring long pumps

- The pump barrel hangs down from the top anchor allowing the barrel to align itself in deviated or horizontal wells.

Recommended for wells with abnormal temperatures

- Using friction ring hold down instead of cups the pump can perform in wells where the temperature is higher than in normal conditions.

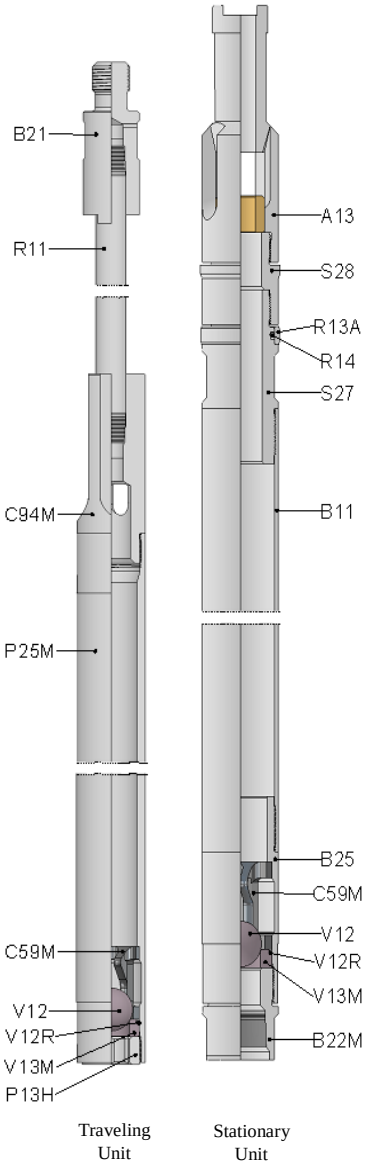
LIMITATIONS OF SWAF PUMP

Valve rod is weak link

- The valve rod is connected to the top plunger bushing and valve rod bushing with modified line pipe threads. The valve rod with modified line pipe threads is not as strong as the sucker rods. Normal pumping action can cause flexing at the valve rod connections leading to fatigue failure.

Line-up SWAF

Component Type	Description	Part Symbol	
		Tubing Size and Pump Bore (inches)	
		2-7/8 2	3-1/2 2-1/2
Traveling Unit			
B21	Bushing, Valve Rod	B21-25-XXXX	B21-30-XXXX
R11	Rod, Valve[1]	R11-25-XXXX	R11-30-XXXX
C94M	Cage, TPA, Be Plunger	C94M200-XXXX	C94M250-XXXX
P25M	Plunger, One Piece, Box End[1,2]	P25M200-XXXX	P25M250-XXXX
C59M	Cage, Modified Insert Type Guide	C59M200-XXXX	C59M250-XXXX
V12	Valve, Ball	V12-200-XXXX	V12-250-XXXX
V12R	Valve, Seat O-ring	V12R200-XXXX	V12R250-XXXX
V13M	Valve, Seat O-ring Prep	V13M200-XXXX	V13M250-XXXX
P13H	Hex Plug seat	P13H200-XXXX	P13H250-XXXX
Stationary Unit			
A13	Sand Check	A13-200-XXXX	A13-250-XXXX
S28	Bushing, Top Hldn W/Friction Ring	S28-25-XXXX	S28-30-XXXX
R13A	Friction Ring[3]	R13A25-XXXX	R13A30-XXXX
R14	Friction Ring, O-ring	R14-25-XXXX	R14-30-XXXX
S27	Connector, Brl to Top Hldn w/Friction Ring	S27-25-XXXX	S27-30-XXXX
B11	Barrel, Thin Wall[1]	B11-200-XXXX	B11-250-XXXX
B25	Cage Closed, Insert Prep	B25-25-XXXX	B25-30-XXXX
C59M	Cage, Modified Insert Type Guide	C59M225-XXX	C59M325-XXXX
V12	Valve, Ball	V12-225-XXXX	V12-325-XXXX
V12R	Valve, Seat O-ring	V12R225-XXXX	V12R325-XXXX
V13M	Valve, Seat O-ring prep	V13M225-XXXX	V13M325-XXXX
B22M	Bushing, Barrel Cage	B22M25-XXXX	B22M30-XXXX
Seating Nipple (not shown or included in assembly)			
N16	Seating Nipple, Friction Ring Top Hold-down	N16-25-XXXX	N16-30-XXXX



1 Add -LL for length in feet for plunger, barrel and valve rod

2 Add -FF for fit in thousandths of an inch for plunger

3 Add 3 digits suffix to friction ring for holding force

Notes

- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.
- For friction ring holding force see pump part section.

JHA Capture Chamber Pump, Top Anchor

Description

The CDI JHA pump is a precision, insert rod type with an API B12 heavy wall barrel and either a cup or mechanical top anchor (hold-down).

CDI JHA pumps are available in 1-1/4, 1-1/2, 1-3/4 and 2-1/4 inch bore sizes.

The API B12 heavy wall barrel is externally threaded and has an inside diameter tolerance of +0.002 / -0.000 inches.

The JHA pump assembly is installed in the well on the end of the sucker rod string and seated in the seating nipple installed in the tubing string at a predetermined depth.

Pump designed to increase the pumping efficiency in high gas - liquid ratio (GLR) wells, eliminating the gas lock and fluid pound. Each stroke, a small amount of fluid is transferred from tubing in the compression chamber of the pump. The same time, an equivalent volume of free gas escapes in the tubing. A proper spacing between the traveling and standing valves maximizes the compression ratio and allows the fluid transfer on each stroke.

ADVANTAGES OF JHA PUMP

Recommended for sandy wells

- The top anchor (hold-down) eliminates sand settling between the pump barrel and tubing on the hold-down contrasted with a bottom anchor pump which can become sanded in and cause a stripping job.
- The fluid is discharged through the guide approximately 3 inches above the hold-down which limits the amount of sand that can settle over the hold-down.
- The top anchor is even better than a traveling barrel bottom anchor pump, since if a traveling barrel pump is spaced too high, sand can settle on the hold-down around the pull tube right up to the lowest point reached by the pull plug on the downstroke.

Recommended for low fluid level, gassy or foamy wells

- The top anchor pump allows the standing valve to be submerged in the fluid being pumped. This allows the fluid level to be pumped down lower below the seating nipple than with a bottom anchor pump.
- The pump barrel can act as a gas anchor in gassy installations.
- The capture chamber and the holes in plunger allows an amount of produced fluid to drain in on top of the standing valve. This allows the pump to build enough pressure to overcome hydrostatic tubing pressure on the downstroke, preventing a gas lock situation.

Recommended for wells with scale or gyp

- The JHA pump barrel assembly consists of two barrels which are connected with an extension coupling (capture chamber) and an upper extension coupling. The plunger will stroke out both ends of the barrels.
- This eliminates gyp or scale forming in the barrel which could prevent removal of the plunger from the barrel.

Recommended for wells requiring long pumps

- The pump barrel hangs down from the top anchor allowing the barrel to align itself in deviated or horizontal wells.

LIMITATIONS OF JHA PUMP

Not recommended for deep wells

- On the downstroke, the fluid load in the tubing is supported by the standing valve and barrel which puts a tensile load on the barrel. This can cause a tensile failure of the extension threads if the pump is too deep.
- The formation or suction pressure around the outside of the barrel is low whereas the pressure due to the fluid load on the downstroke inside the barrel is high. This can cause the barrel to burst if the pump is too deep.
- Should a fluid pound condition exist, the force of the plunger hitting the fluid will create a sudden high pressure inside the barrel. This can also cause the extensions to fail.
- JHA pumps are generally not recommended for depths below 7000 feet. The bore size of the pump, pump barrel material, well conditions and fluid pound, control the setting depth of JHA pumps. These criteria must be considered when determining the setting depth.

Not recommended for intermittent pumping in sandy wells

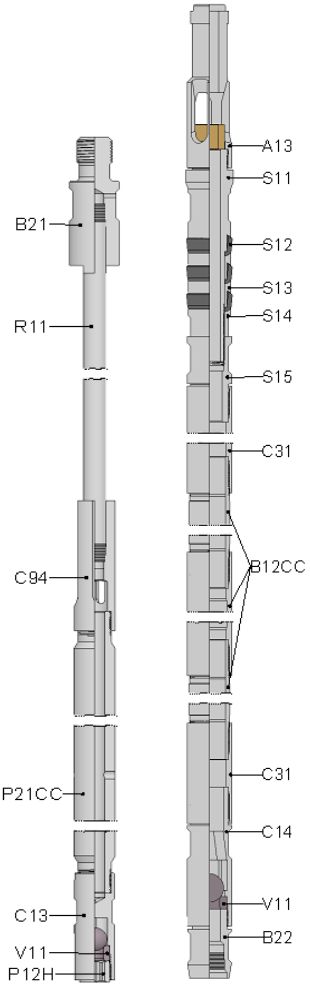
- When the pump is shut down, sand can settle between the inside of the barrel and the outside of the plunger which could lead to the pump sticking.
- When the pump is shut down, the plunger assembly should be at the top of the upstroke. When the pump is turned on, it is easier for the plunger to fall should there be any sand accumulation. If the plunger assembly was at the bottom of the downstroke, the sand accumulation could cause a sticking problem.

Tubing erosion opposite top guide

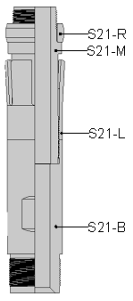
- Fluid flow out of the port of the guide can impinge against the tubing and cause erosion and possible tubing leak or failure.
- Guides having multiple ports directed upward will cause fluid flow up the tubing rather than impinging on the tubing I.D.

Line-up JHA

Component Type	Description	Part Symbol			
		Tubing Size and Pump Bore (inches)			
		2-3/8 1-1/4	2-7/8 1-1/2	2-7/8 1-3/4	3-1/2 2-1/4
Traveling Unit					
B21	Bushing, Valve Rod	B21-20-XXXX	B21-25-XXXX	B21-25-XXXX	B21-30-XXXX
R11	Rod, Valve[1]	R11-20-XXXX	R11-25-XXXX	R11-25-XXXX	R11-30-XXXX
C94	Cage, Open, TPA, W/out Seat Prep	C12-125-XXXX	C12-150-25-XXXX	C12-175-XXXX	C12-225-XXXX
P21CC	Plunger, Pin End, Capture Chamber[1,2]	P21CC125-XXXX	P21CC150-XXXX	P21CC175-XXXX	P21CC225-XXXX
C13	Cage, Closed Plunger	C13-125-XXXX	C13-150-XXXX	C13-175-XXXX	C13-225-XXXX
V11	Valve, Ball and Seat	V11-125-XXXX	V11-150-XXXX	V11-175-XXXX	V11-225-XXXX
P12H	Plug Hex, Seat Retainer	P12H125-XXXX	P12H150-XXXX	P12H175-XXXX	P12H225-XXXX
Stationary Unit					
A13	Guide, Valve Rod	A13-150-20-XXXX	A13-200-XXXX	A13-200-XXXX	A13-250-XXXX
C31	Coupling, Extension[3]	C31-125-XXXX	C31-150-XXXX	C31-175-XXXX	C31-225-XXXX
B12CC	Barrel, Heavy Wall, Capture Chamber[1]	B12CC125-XXXX	B12CC150-XXXX	B12CC175-XXXX	B12CC225-XXXX
C31	Coupling, Extension	C31-125-XXXX	C31-150-XXXX	C31-175-XXXX	C31-225-XXXX
C14	Cage, Closed Barrel	C14-20-XXXX	C14-25-XXXX	C14-25-XXXX	C14-30-XXXX
V11	Valve, Ball and Seat	V11-175-XXXX	V11-225-XXXX	V11-225-XXXX	V11-250-XXXX
B22	Bushing, Barrel Cage	B22-20-XXXX	B22-25-XXXX	B22-25-XXXX	B22-30-XXXX
Standard Seating Assembly (JHAC Pump)					
S10	API 3-Cup, Type HR[4]	S10-20-XXXX	S10-25-XXXX	S10-25-XXXX	S10-30-XXXX
S15	Bushing, Seating Cup	S15-20-XXXX	S15-25-XXXX	S15-25-XXXX	S15-30-XXXX
Seating Nipple (not shown or included in assembly)					
N11	Nipple, Seating, Cup[5]	N11-20-XXXX	N11-25-XXXX	N11-25-XXXX	N11-30-XXXX
Optional Seating Assembly (JHAM Pump)					
S21	API Mechanical Top Lock[6]	S21-20-XXXX	S21-25-XXXX	S21-25-XXXX	S21-30-XXXX
Seating Nipple (not shown or included in assembly)					
N14	Nipple, Seating, Mechanical	N14-20-XXXX	N14-25-XXXX	N14-25-XXXX	N14-30-XXXX



Traveling Unit | Stationary Unit



Optional Seating Assembly

1 Add -LL for length in feet for plunger, barrel and valve rod
2 Add -FF for fit in thousandths of an inch for plunger
3 Add -LL for length in inches for coupling extensions
4 Add -SSS for cup size for 3-cup seating assembly. S10 contains S11, S12, S13, S14
5 Add -012 for nipple length
6 Add-ASM to part symbol to indicate assembly. ASM contains S21-M, S21-R, S21-L,

Notes

- When a cup hold-down is used, the pump is a type JHAC.
- When a mechanical hold-down is used, the pump is a type JHAM.
- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.

JHB Capture Chamber Pump, Bottom Anchor

Description

The CDI JHB pump is a precision, insert rod type with an API B12 heavy wall barrel and either a cup or mechanical bottom anchor (hold-down).

CDI JHB pumps are available in 1-1/4, 1-1/2, 1-3/4 and 2-1/4 inch bore sizes.

The API B12 heavy wall barrel is externally threaded and has an inside diameter tolerance of +0.002 / -0.000 inches.

The JHB pump assembly is installed in the well on the end of the sucker rod string and seated in the seating nipple installed in the tubing string at a predetermined depth.

Pump designed to increase the pumping efficiency in high gas - liquid ratio (GLR) wells, eliminating the gas lock and fluid pound. Each stroke, a small amount of fluid is transferred from tubing in the compression chamber of the pump. The same time, an equivalent volume of free gas escapes in the tubing. A proper spacing between the traveling and standing valves maximizes the compression ratio and allows the fluid transfer on each stroke.

ADVANTAGES OF RHB PUMP

Recommended for deep wells

- Pressure due to fluid load in the tubing acts on the O.D. of the barrel and the I.D. of the barrel above the plunger.
- This balanced pressure around the barrel overcomes the disadvantages of a top anchor (hold-down) pump; that is, tensile loading on the barrel during downstroke and potential for the barrel to burst due to internal pressure or fluid pound.

Recommended for low fluid level, gassy wells

- Fluid has only to pass through the anchor and standing valve to be in the producing chamber of the pump.
- The capture chamber and the holes in plunger allows an amount of produced fluid to drain in on top of the standing valve. This allows the pump to build enough pressure to overcome hydrostatic tubing pressure on the downstroke, preventing a gas lock situation.

Recommended for wells with scale or gyp

- The JHB pump barrel assembly consists of two barrels which are connected with an extension coupling (capture chamber) and an upper extension coupling. The plunger will stroke out both ends of the barrels.
- This eliminates gyp or scale forming in the barrel which could prevent removal of the plunger from the barrel.

LIMITATIONS OF RHB PUMP

Not recommended for sandy wells

- Sand can settle on the bottom anchor between the O.D. of the barrel and the I.D. of the tubing. This can cause the pump to be sanded in which could lead to pulling a "wet string" to remove the pump.
- A top seal assembly can be run on top of a bottom anchor pump to eliminate sand settling on the bottom anchor. The top seal assembly is run between the guide and the top of the barrel and seals (or packs off) the annulus between the tubing I.D. and the barrel O.D.

Barrel subject to corrosive attack

- Corrosive fluid will be stagnant between the tubing I.D. and the barrel O.D. causing corrosion to attack the outside of the barrel.
- A bottom discharge valve can be installed on the lower end of the barrel. This allows a portion of the produced fluid to be discharged into the annulus between the tubing I.D. and the barrel O.D. This keeps the fluid in motion preventing corrosive attack on the barrel O.D. due to stagnant corrosive fluid. This also aids in keeping sand from settling on the bottom anchor.

Not recommended for intermittent pumping in sandy wells

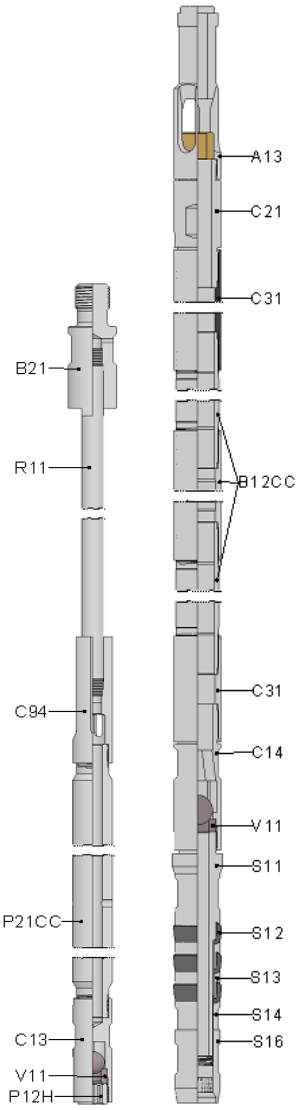
- When the pump is shut down, sand can settle between the inside of the barrel and the outside of the plunger which could lead to pump sticking.
- When the pump is shut down, the plunger assembly should be at the top of the upstroke. When the pump is turned on, it is easier for the plunger to fall should there be any sand accumulation. If the plunger assembly was at the bottom of the downstroke, the sand accumulation could cause a sticking problem

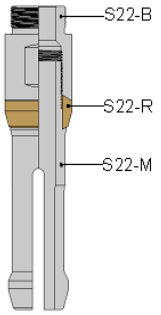
Tubing erosion opposite top guide

- Fluid flow out of the port of the guide can impinge against the tubing and cause erosion and possible tubing leak or failure.
- Guides having multiple ports directed upward will cause fluid flow up the tubing rather than impinging on the tubing I.D.

Line-up JHB

Component Type	Description	Part Symbol			
		Tubing Size and Pump Bore (inches)			
		2-3/8 1-1/4	2-7/8 1-1/2	2-7/8 1-3/4	3-1/2 2-1/4
Traveling Unit					
B21	Bushing, Valve Rod	B21-20-XXXX	B21-25-XXXX	B21-25-XXXX	B21-30-XXXX
R11	Rod, Valve[1]	R11-20-XXXX	R11-25-XXXX	R11-25-XXXX	R11-30-XXXX
C94	Cage, Open, TPA, W/out Seat Prep	C12-125-XXXX	C12-150-25-XXXX	C12-175-XXXX	C12-225-XXXX
P21CC	Plunger, Pin End, Capture Chamber	P21CC125-XXXX	P21CC150-XXXX	P21CC175-XXXX	P21CC225-XXXX
C13	Cage, Closed Plunger	C13-125-XXXX	C13-150-XXXX	C13-175-XXXX	C13-225-XXXX
V11	Valve, Ball and Seat	V11-125-XXXX	V11-150-XXXX	V11-175-XXXX	V11-225-XXXX
P12H	Plug Hex, Seat Retainer	P12H125-XXXX	P12H150-XXXX	P12H175-XXXX	P12H225-XXXX
Stationary Unit					
A13	Guide, Valve Rod	A13-150-20-XXXX	A13-200-XXXX	A13-200-XXXX	A13-250-XXXX
C21	Connector, Barrel	C21-20-XXXX	C21-25-XXXX	C21-25-XXXX	C21-30-XXXX
C31	Coupling, Extension[3]	C31-125-XXXX	C31-150-XXXX	C31-175-XXXX	C31-225-XXXX
B12CC	Barrel, Heavy Wall, Capture Chamber[1]	B12CC125-XXXX	B12CC150-XXXX	B12CC175-XXXX	B12CC225-XXXX
C31	Coupling, Extension	C31-125-XXXX	C31-150-XXXX	C31-175-XXXX	C31-225-XXXX
C14	Cage, Closed Barrel	C14-20-XXXX	C14-25-XXXX	C14-25-XXXX	C14-30-XXXX
V11	Valve, Ball and Seat	V11-175-XXXX	V11-225-XXXX	V11-225-XXXX	V11-250-XXXX
Standard Seating Assembly (JHBC Pump)					
S10	API 3-Cup, Type HR[4]	S10-20-XXXX	S10-25-XXXX	S10-25-XXXX	S10-30-XXXX
S16	Coupling, Seating Cup	S16-20-XXXX	S16-25-XXXX	S16-25-XXXX	S16-30-XXXX
Seating Nipple (not shown or included in assembly)					
N11	Nipple, Seating, Cup[5]	N11-20-XXXX	N11-25-XXXX	N11-25-XXXX	N11-30-XXXX
Optional Seating Assembly (JHBM Pump)					
S22	API Mechanical Btm Lock[6]	S22-20-XXXX	S22-25-XXXX	S22-25-XXXX	S22-30-XXXX
Seating Nipple (not shown or included in assembly)					
N12	Nipple, Seating, Mechanical	N12-20-XXXX	N12-25-XXXX	N12-25-XXXX	N12-30-XXXX





Optional Seating Assembly

1 Add -LL for length in feet for plunger, barrel and valve rod
2 Add -FF for fit in thousandths of an inch for plunger
3 Add -LL for length in inches for coupling extensions
4 Add -SSS for cup size for 3-cup seating assembly. S10 contains S11, S12, S13, S14
5 Add -012 for nipple length
6 Add -ASM to part symbol to indicate assembly. ASM contains S22-R, S22-M, S22-B

Notes

- When a cup hold-down is used, the pump is a type JHBC.
- When a mechanical hold-down is used, the pump is a type JHBM.
- Alternate parts can be found in the catalog section for each component type.
- XXXX indicates material designator. See pump parts section.

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