

BULLETIN NO.	TOPIC	ISSUE DATE	ISSUED BY
LS-TB-014 V1	PC PUMP CHARGE PUMP OVERVIEW	JANUARY 20, 2021	ENGINEERING

BACKGROUND

A progressing cavity pump (PCP) is normally configured for primary production. Charge pumps are used to either pre-compress gas in the produced fluid or circulate fluid to keep the pump intake agitated and free of sand blockages. The volumetric ratio of the charge pump to the production pump can be 1:1 up to as much as 4:1 depending on the application. Charge pump lift is normally between 200-300m and is independent of the production pump requirements.

INSTALLATION

The charge pump rotor must pass through the primary production pump stator. Geometry combinations are selected so the charge pump rotor will pass through the production stator with relative ease. Lifting solutions offers standard configurations that are verified for compatibility and provide flexibility in the charge to production pump ratio. Space out between the production pump and charge pump requires a pup joint and a 10" nipple that can be ported if needed for fluid circulation or gas exhaustion. The pony rod requirement is always equal to the pup joint length minus 2 feet. For example the tubing can be configured with a 10ft pup joint and a 10in ported nipple along with a pony rod of 8ft in length.

IDEAL CHARGE/PRIMARY

Table 1 represents the effective ratio between the charge and primary pump options based on ease of installation. The primary production pumps are always in a larger tube size.

Charge PCP ⇨		3.50-in. OD						3.75-in. OD			4.13-in. OD		
Primary PCP ⇩		10	15	20	30	41	55	68	85	120	105	145	190
3.75-in. OD	8	1.3	1.9	2.5	3.8	5.1	6.9	-	-	-	-	-	-
	13	-	1.2	1.5	2.3	3.2	4.2	-	-	-	-	-	-
	18	-	-	1.1	1.7	2.3	3.1	-	-	-	-	-	-
	28	-	-	-	1.1	1.5	2.0	-	-	-	-	-	-
	43	-	-	-	-	-	1.3	-	-	-	-	-	-
4.13-in. OD	23	-	-	-	1.3	1.8	2.4	-	-	-	-	-	-
	61	-	-	-	-	-	-	1.1	1.4	2	-	-	-
	72	-	-	-	-	-	-	-	1.2	1.7	-	-	-
5.0-in. OD	35	-	-	-	-	1.2	1.6	1.9	2.4	3.4	3.0	4.1	5.4
	47	-	-	-	-	-	1.2	1.4	1.8	2.6	2.2	3.1	4.0
	64	-	-	-	-	-	-	1.1	1.3	1.9	1.6	2.3	3
	88	-	-	-	-	-	-	-	-	1.4	1.2	1.6	2.2
	118	-	-	-	-	-	-	-	-	-	-	1.2	1.6

Table 1 – Effective charge/primary pump ratio (Green is preferred, Yellow is optional)

RECOMMENDED CHARGE/PRIMARY PUMP COMBINATIONS

Lifting Solutions recommends the following charge/primary pump combinations including charge pump lift and recommended ported nipple configurations.

Primary PCP	Charge PCP	Charge Lift(s)	Ported Nipple (@100rpm)
8	15	300	A
	20	300	B
	30	300	C
13	20	300	B
	30	300	C
	41	200	D
18	30	300	C
	41	200	D
	55	200	E
23	30	300	C
	41	200	D
	55	200	E
28	41	200	D
	55	200	E
43	55	200	E
61	85	250	E
	120	200	F
72	120	200	F
35	68	200	E
	85	250	E
	120	200	F
64	105	200	F
	120	200	F
	145	200	F
	190	200	F
118	190	200	F



Table 2 – Recommended primary, charge, lift and ported nipple configuration.

PORTED NIPPLE CIRCULATION AREA

Standard 42inch ported nipple configurations are available. Porting is used to allow gas/fluid to exit the pup joint assembly and establishes a slight pressure increase between the two pumps.

Ported Nipples	Hole Size	Hole QTY	Hole CSA	Circulation CSA
A	0.38	6	0.016	0.093
B	0.50	4	0.049	0.196
C	0.63	4	0.120	0.479
D	0.75	4	0.249	0.994
E	1.00	3	0.785	2.356
F	1.00	2	1.767	3.534

Table 2 – Ported Nipple, Circulation Cross Sectional Area

CONCLUSION

A properly sized primary and charge pump assembly is critical to achieving desired operational efficiency. Several variables play an important role in the effectiveness of these systems and contribute to application success. This bulletin establishes general guidelines based on a larger scale test program to predict gas separation efficiency. These guidelines are applied to the Lifting Solutions PCP product line and provide a consolidated list of options available.