

Interpret data tables

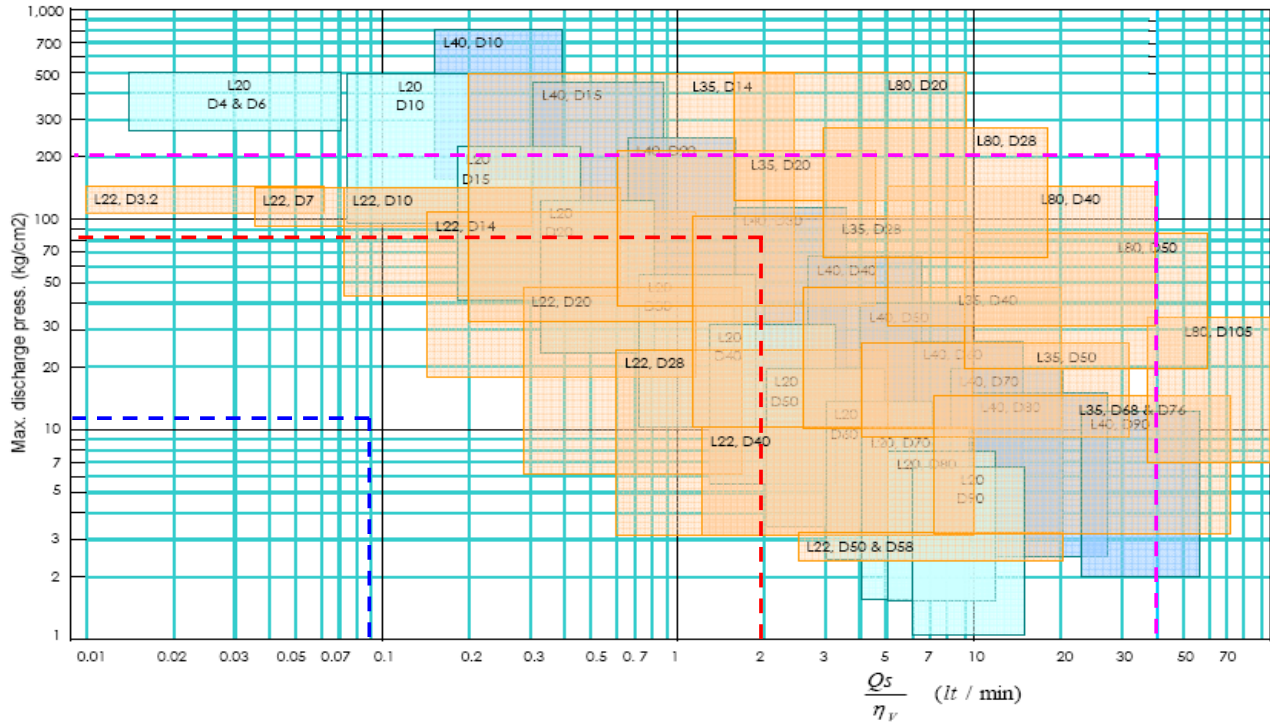
Dmin (mm)	Dmax (mm)	L (mm)	z min	z max	Nmin	Nmax (RPM)	Qmin (m ³ /hr)	Qmax (m ³ /hr)	Qmin (Lt/min)	Qmax (Lt/min)	ID suction nozzle (mm)	ID disch. nozzle (mm)
Metering Pump												
	3.2	22	1	3	45	130	0.000	0.00	0.01	0.07		
	7	22	1	3	45	130	0.002	0.02	0.04	0.33		
	10	22	1	3	45	130	0.005	0.04	0.08	0.67		
	14	22	1	3	45	130	0.009	0.08	0.15	1.32		
	20	22	1	3	45	130	0.019	0.16	0.31	2.70		
	28	22	1	3	45	130	0.037	0.32	0.61	5.28		
	40	22	1	3	45	130	0.075	0.65	1.24	10.78		
	50	22	1	3	45	130	0.117	1.01	1.94	16.85		
	58	22	1	3	45	130	0.157	1.36	2.62	22.67		
	14	35	1	3	45	160	0.015	0.16	0.24	2.59		
	20	35	1	3	60	160	0.040	0.32	0.66	5.28		
	28	35	1	3	60	160	0.078	0.62	1.29	10.35		
	40	35	1	3	60	160	0.16	1.27	2.64	21.11		
	50	35	1	3	60	160	0.25	1.98	4.12	32.99		
	68	35	1	3	60	160	0.46	3.66	7.63	61.02		
	76	35	1	3	60	160	0.57	4.57	9.53	76.22		
	14	55	1	3	60	130	0.03	0.20	0.51	3.30		
	20	55	1	3	60	130	0.06	0.40	1.04	6.74		
	28	55	1	3	60	160	0.12	0.98	2.03	16.26		
	40	55	1	3	60	160	0.25	1.99	4.15	33.18		
	50	55	1	3	60	160	0.39	3.11	6.48	51.84		
	68	55	1	3	60	160	0.72	5.75	11.99	95.89		
	78	55	1	3	60	160	0.95	7.57	15.77	126.17		
	105	55	1	3	60	160	1.71	13.72	28.58	228.63		
	120	55	1	3	60	160	2.24	17.92	37.33	298.62		
	20	80	1	3	60	130	0.09	0.59	1.51	9.80	25	20
	28	80	1	3	60	130	0.18	1.15	2.96	19.21	40	25
	40	80	1	3	60	130	0.36	2.35	6.03	39.21	50	40
	50	80	1	3	60	130	0.57	3.68	9.43	61.27	50	40
	68	80	1	3	60	130	1.05	6.80	17.43	113.32	65	50
	76	80	1	3	60	130	1.31	8.49	21.78	141.56	65	50
	105	80	1	3	60	130	2.49	16.21	41.57	270.20	80	65
	120	80	1	3	60	130	3.26	21.17	54.29	352.91	80	65
4	4	20	1	1	56	140	0.00	0.0019	0.013	0.032		
6	6	20	1	1	56	140	0.00	0.0043	0.028	0.072		
10	10	20	1	1	56	140	0.00	0.0120	0.082	0.200		
15	15	20	1	1	56	140	0.01	0.0280	0.183	0.467		
20	20	20	1	1	56	140	0.02	0.049	0.333	0.817		
29	29	20	1	1	56	140	0.04	0.110	0.733	1.833		
39	39	20	1	1	56	140	0.08	0.200	1.317	3.333		
49	49	20	1	1	56	140	0.12	0.310	2.000	5.167		
58	58	20	1	1	56	140	0.18	0.440	3.000	7.333		
68	68	20	1	1	56	140	0.24	0.600	4.000	10.000		
73	73	20	1	1	56	140	0.31	0.70	5.167	11.667		
87	87	20	1	1	56	140	0.40	0.99	6.667	16.500		

Dmin (mm)	Dmax (mm)	L (mm)	z min	z max	Nmin	Nmax (RPM)	Qmin (m ³ /hr)	Qmax (m ³ /hr)	Qmin (Lt/min)	Qmax (Lt/min)	ID suction nozzle (mm)	ID disch. nozzle (mm)
Metering Pump												
10	10	40	1	1	56	140	0.01	0.025	0.16	0.42		
15	15	40	1	1	56	140	0.02	0.055	0.37	0.92		
20	20	40	1	1	56	140	0.04	0.098	0.65	1.63		
29	29	40	1	1	56	140	0.09	0.220	1.47	3.67		
39	39	40	1	1	56	140	0.16	0.390	2.67	6.50		
49	49	40	1	1	56	140	0.25	0.610	4.17	10.17		
58	58	40	1	1	56	140	0.35	0.880	5.83	14.67		
68	68	40	1	1	56	140	0.48	1.200	8.00	20.00		
78	78	40	1	1	56	140	0.63	1.600	10.50	26.67		
88	88	40	1	1	56	140	0.80	2.000	13.33	33.33		
98	98	40	1	1	56	140	0.98	2.500	16.33	41.67		
116	116	40	1	1	56	140	1.40	3.500	23.33	58.33		
Process Pump												
20	40	30		3		660	1.50	4.49	24.9	74.8		
24	50	40		3		600	2.83	8.50	47.2	141.6		
18	58	50		3		540	4.29	12.86	71.5	214.4		
20	68	70		3		450	6.88	20.63	114.6	343.8		
32	85	100		3		330	11.26	33.77	187.6	562.8		
32	85	150		3		230	11.77	35.30	196.1	588.4		
44	115	150		3		230	21.54	64.62	359.0	1077.0		
50	160	150		3		180	32.63	97.89	543.9	1631.6		
19	38	64		3		550	2.40	7.20	40.0	120.0	38.1	38.1
25	38	111		3		450	3.41	10.22	56.8	170.3	49.3	38.1
32	48	140		3		380	5.79	17.36	96.4	289.3	73.7	49.3
35	76	111		3		450	13.62	40.86	227.0	681.0	97.2	73.7
44	89	140		3		380	19.89	59.68	331.6	994.7	146.3	73.7
35	48	127		3		360	4.97	14.92	82.9	248.7	73.7	49.3
51	89	127		3		360	17.10	51.29	285.0	854.9	146.3	73.7
45	133	152		3		360	45.70	137.09	761.6	2284.8	193.7	146.3
57	133	178		7		327	48.61	340.25	810.1	5670.9	193.7	146.3

Example 1. Capacity 0.6 Lt/min is within the range in red box. There are 6 choices which has 3 possibilities number of plunger : simplex, duplex or triplex.

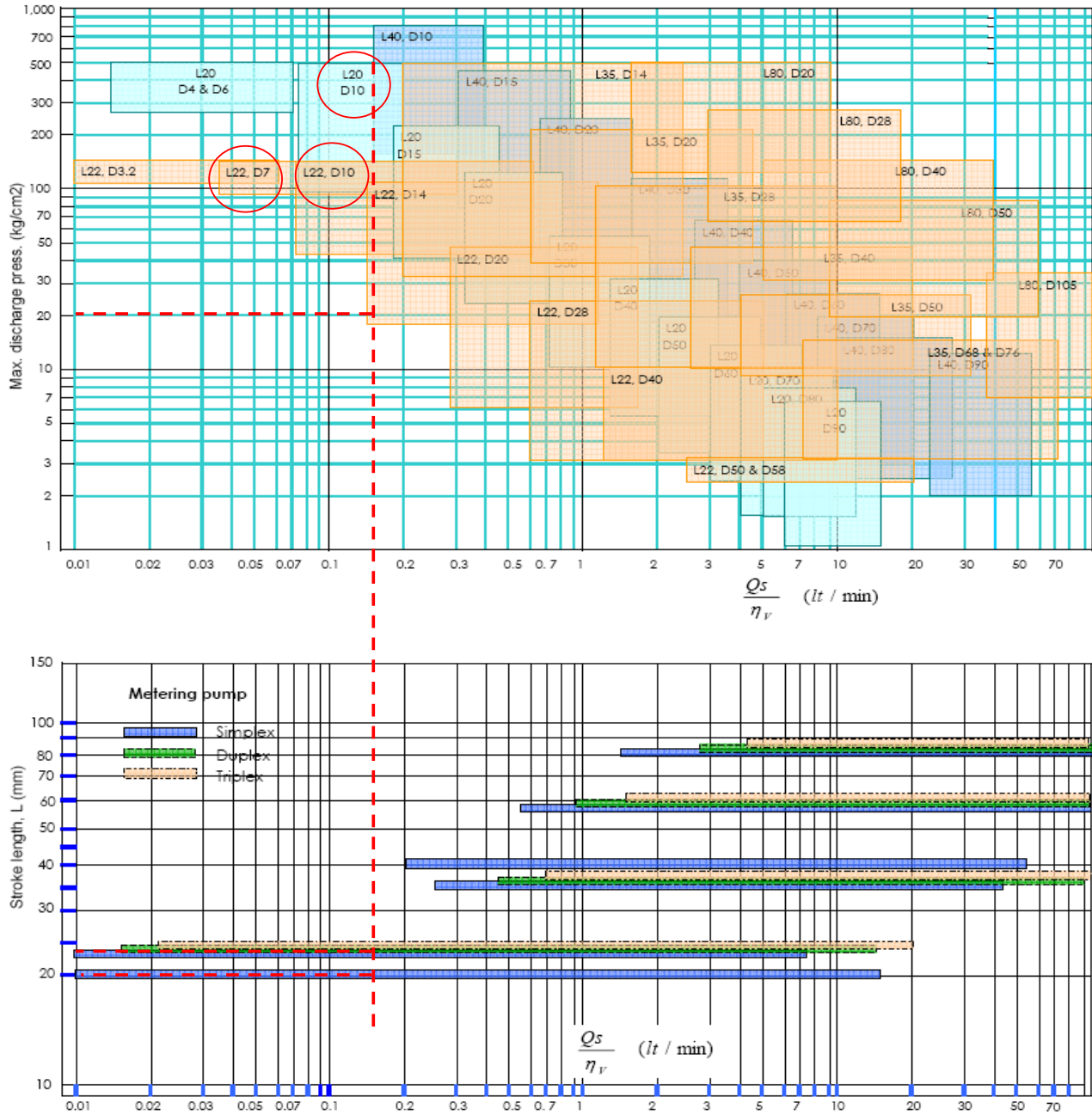
Example 2. Capacity 70 m³/hr is within the range in blue box. There are 4 choices which has 4 possibilities diameter of plunger, stroke length and crankshaft speed.

Interpret the pressure - capacity charts



- Example 1. Required condition is, capacity = 2 Lt/min and discharge pressure = 80 kg/cm².
Cross point of these condition is in the range of model L35/D20, L35/D28 and L40/D30,
- Example 2. Required condition is, capacity = 0.09 Lt/min and discharge pressure = 11 kg/cm².
Cross point of these condition is at below of all models. But still available to be serviced by model L22/D7, L22/D10 and L20/D10 (draw vertical line up to above models even at higher pressure)
- Example 3. Required condition is, capacity = 40 Lt/min and discharge pressure = 200 kg/cm².
Cross point of these condition is at upper of all models. But still available to be serviced by 3 parallel installation of L80/D28.

Interpret the stroke length - capacity charts



Example 1. Required capacity is 0.15 Lt/min. Which pump is available. Vertical line cross bars at L20/D10 simplex, L22/D10 and L22/D7. On the data table, Max-min crank speed is 140-56 RPM for L20 and 130-45 RPM for L22.

On the next chart (L - N chart), cross point is at plunger velocity $U_p = 0.1$ m/s for both size which indicates relatively low velocity and still below 0.35 m/s.

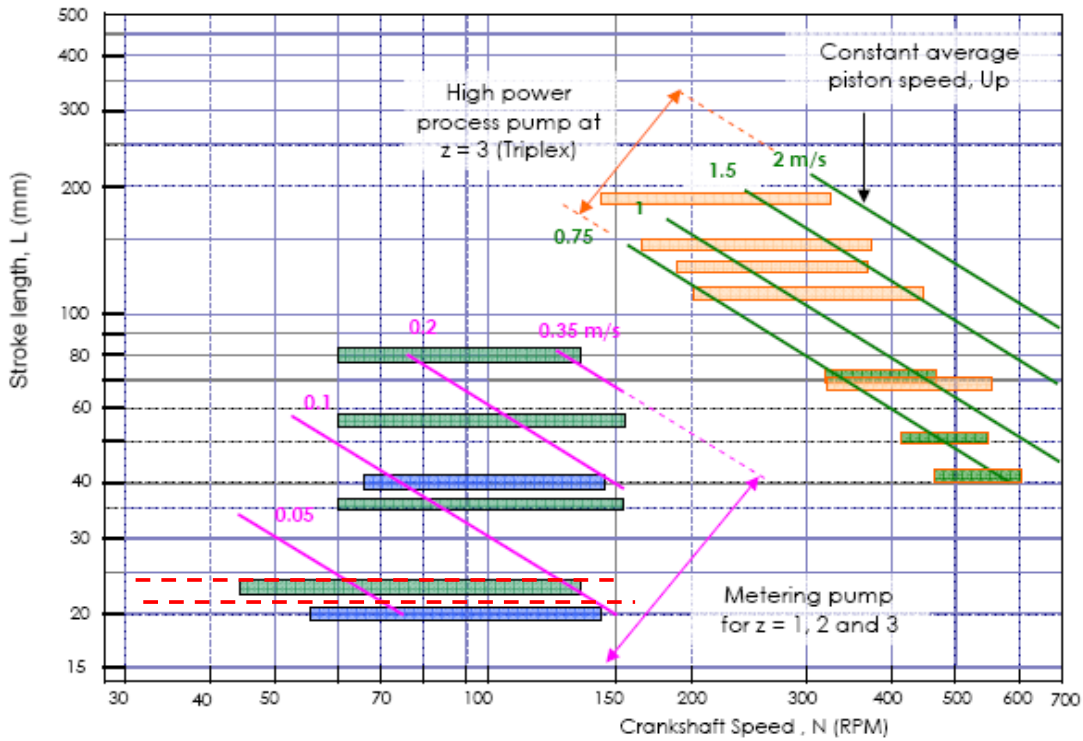
Number of plunger and crank speed: (Q in Lt/min)

$$z = (Q \times 10^6) / (0.25 \times 3.142 \times D^2 \times L \times N), \text{ and } N = (Q \times 10^6) / (0.25 \times 3.142 \times D^2 \times L \times z)$$

$$z = \text{integer of } 0.682 = 1, \text{ simplex for L20/D10. Verify N for } z=1 \text{ is } 96 \text{ RPM}$$

$$z = \text{integer of } 0.668 = 1, \text{ simplex for L22/10. Verify N for } z=1 \text{ is } 87 \text{ RPM}$$

$$z = \text{integer of } 1.5 = 2, \text{ duplex for L22/D7. Verify N for } z=2 \text{ is } 89 \text{ RPM}$$



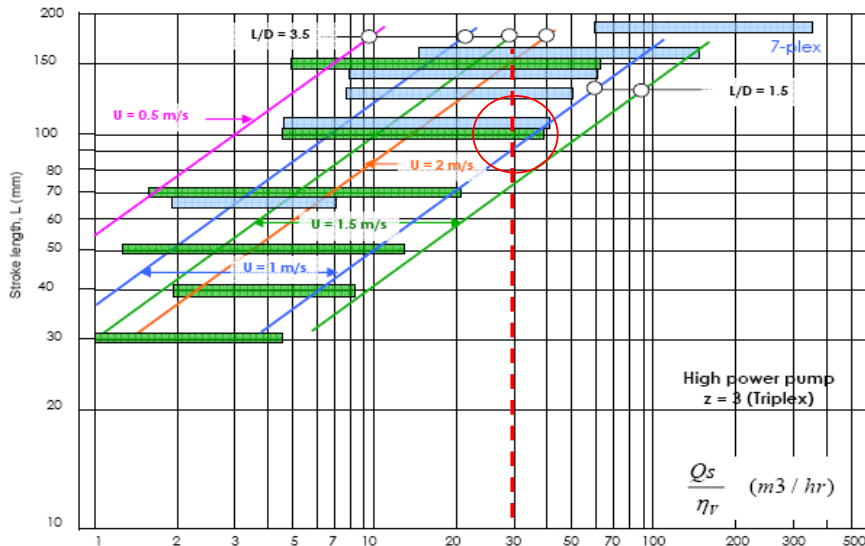
Example 2. Required capacity is 30 m³/hr . Which pump is available. From data table, appropriate pump model are L100/D85, L150/D115, L111/D76, L127/D89, L140/D89 all are triplex. Maximum crank speed of those models are:

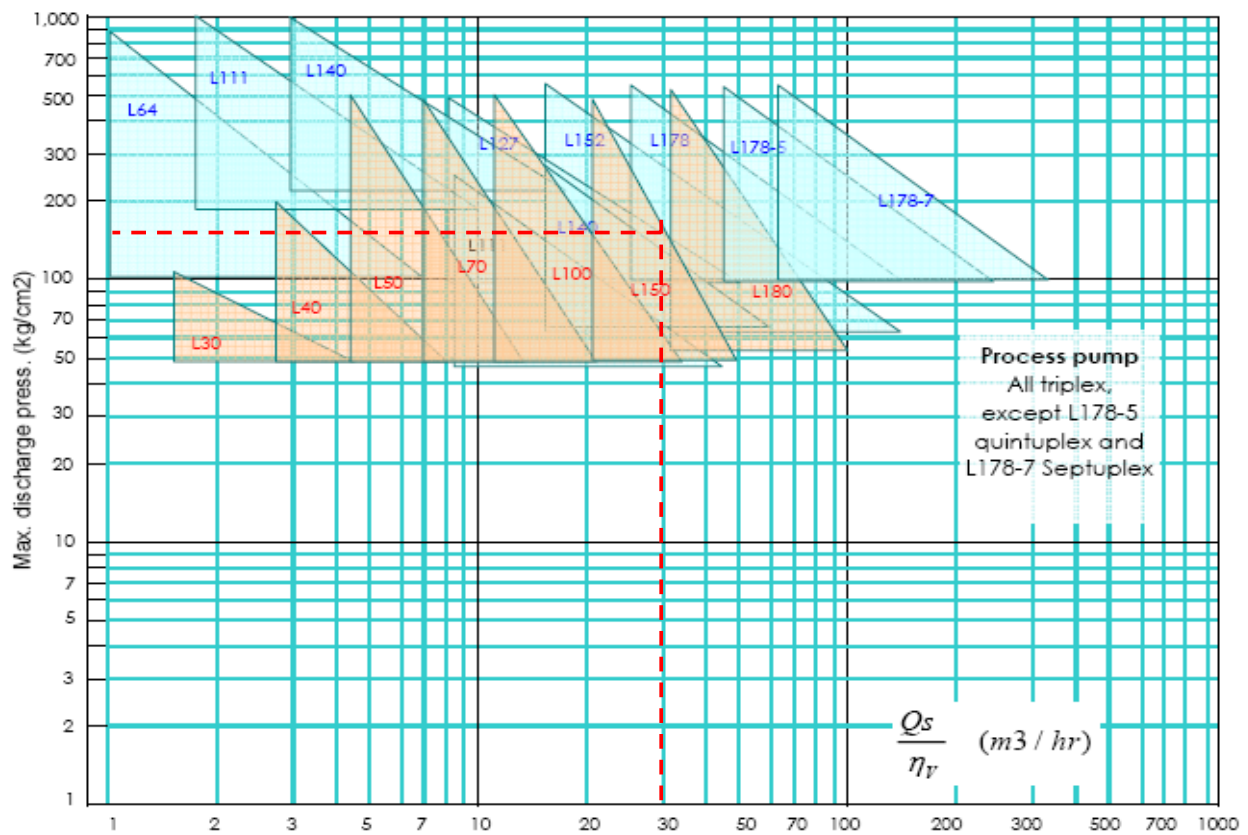
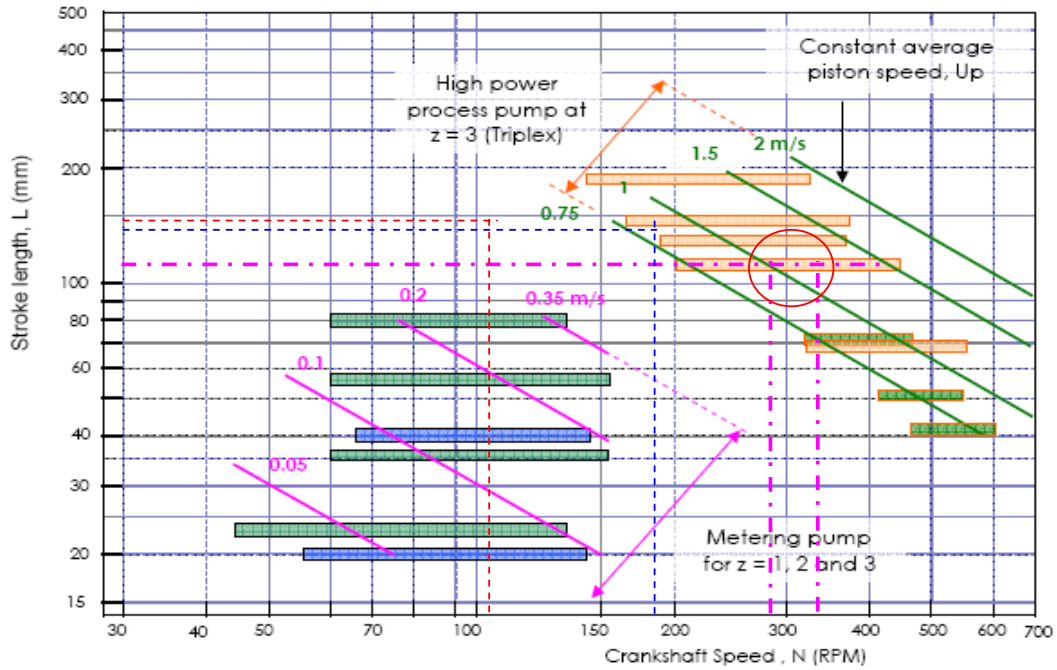
L100/D85	330 RPM
L150/D115	230 RPM
L111/D76	450 RPM
L127/D89	360 RPM
L140/D89	380 RPM

Verify whether N is < N_{max} and U_p is still < 2 m/s

$$N = (Q \times 10^9) / (0.25 \times 3.142 \times D^2 \times L \times 60 \times z) \text{ and } U_p = 2 \times L \times N / 60,000$$

L100/D85, N = 297 < 330 RPM, U _p = 0.98 < 2 m/s	Good
L150/D115, N = 107 < 230 RPM, U _p = 0.36 < 2 m/s	Too slow, too big
L111/D76, N = 331 < 450 RPM, U _p = 1.1 < 2 m/s	Good
L127/D89, N = 210 < 360 RPM, U _p = 0.7 < 2 m/s	Little too slow
L140/D89, N = 191 < 380 RPM, U _p = 0.648 < 2 m/s	Too slow, too big





Example 3. Required capacity is 30 m³/hr and disch. press. 150 kg/cm². Which pump is available. From data table, appropriate pump model are L100/D85, L150/D115, L111/D76, L127/D89, L140/D89 all are triplex. Maximum crank speed of those models are:

L100/D85

L150/D115

L111/D76

L127/D89

L140/D89

Verify whether $N < N_{max.}$, U_p is still < 2 m/s and discharge pressure $<$ allowable disc. pressure of each model (use pressure-capacity chart)

$$N = (Q \times 10^9) / (0.25 \times 3.142 \times D^2 \times L \times 60 \times 3) \text{ and } U_p = 2 \times L \times N / 60,000$$

L100/D85, $N = 297 < 330$ RPM, $U_p = 0.98 < 2$ m/s, DP $>$ allowable

L150/D115, $N = 107 < 230$ RPM, $U_p = 0.36 < 2$ m/s, DP $<$ allowable, acceptable even too slow

L111/D76, $N = 331 < 450$ RPM, $U_p = 1.1 < 2$ m/s, DP $>$ allowable

L127/D89, $N = 210 < 360$ RPM, $U_p = 0.7 < 2$ m/s, DP $<$ allowable, accepted even little too slow

L140/D89, $N = 191 < 380$ RPM, $U_p = 0.648 < 2$ m/s, DP $<$ allowable, accepted even too slow