

of these charts should be considered. First, in order to better monitor improvement in the process, the chart should have a lower control limit. Second, it is desirable to have the size of the subgroup large enough so that some nonconformities or nonconforming units are found in most subgroups. In order to develop a useful attribute chart, no more than 25% of the subgroups should have zero nonconforming units (plotting “0” on the chart). The size of a subgroup plays an important role in achieving these two characteristics.

The minimum subgroup size for an effective P chart depends on the average value of p (the center line of the chart). A common guideline in the SPC literature for the p chart is $n > 300/p$. Using the Binomial distribution for different average p 's (p_{bar}), Table 5.5 summarizes the minimum subgroup size required:

1. to expect less than 25% of the subgroups with a subgroup $p = 0$
2. based on the common guideline ($n > 300/p$)
3. to expect a lower control limit > 0

Table 5.5 Minimum Subgroup Sizes for Effective P Charts

Estimate of Average % Nonconforming Units (p_{bar})	Minimum Subgroup Size (n) Required to Have < 25% zero for p 's	Minimum Subgroup Size Common Guideline ($n > 300/p$)	Minimum Subgroup Size Required to Have LCL > 0
0.1	1400	3000	9000
0.5	280	600	1800
1.0	140	300	900
1.5	93	200	600
2	70	150	450
3	47	100	300
4	35	75	220
5	28	60	175
6	24	50	130
8	17	38	104
10	14	30	81
12	12	25	66
15	9	20	51
20	7	15	36
25	5	12	28
30	4	10	22
40	3	8	14
50	2	6	10

Note: for $p > 50$, use $100 - p$ to enter the table (e.g. for $p = 70\%$ use table p of 30% , for $p = 99\%$ use table p of 1% , and so forth.)