SPC DATA SHEET DEFINITIONS

What is SPC (statistical process control)?

SPC is a technique employed to control the system of causes and their variability in a process. The characteristic to be controlled is the variability in the process, which can be measured and evaluated. To do this, data is collected at critical control points for each process and analyzed through statistical methods. The continuous analysis of process control data helps diagnose and correct problems which otherwise would go unnoticed and become part of the final product.

The following is a list of SPC terminology and definitions in common usage.
The terms used in this application are highlighted in red.

AVERAGE	see MEAN
BELL CURVE:	a symmetrical distribution curve with equal tails on either side (e.g. normal distribution(listed below)).
CAPABILITY:	the uniformity of product which a process is capable of producing
CONFIDENCE INTERVAL	the range within which a parameter (mean,standard deviation, etc.) may be expected to be with some specified confidence level.
CONFIDENCE LEVEL:	the estimated probability that a statistical hypothesis is valid
CONTROL CHART:	plot of process variable as a function of time. Control limits (UCL & LCL) are usually plotted for comparison along with the mean (see below)
C(P):	is a capability index defined as (tolerance/6*(sigma)). Its value ranges from 0 to infinity with larger value being more capable. Value > 1.33 process is capable, value between 1.0 & 1.33 process capable but monitor as C(P) value approaches 1.0 C(P) < 1.0 process not capable
C(K):	an index used to determine if the process will produce units within the tolerance limits. If C(K) = C(P) the process is centred on the mean if C(K) <0 the process mean is outside the tolerance limits and if C(K)>0 the 6 sigma spread is within the tolerance limits

Cpl AND Cpu (noncentering coefficients)	if process is not centered (skewed)we can express noncentering by the following equations (note if Cpl = Cpu the process is centered I.e. a Normal Distribution) Cpl = ((X(BAR) - LSL)/3)*σ & Cpu = ((USL - X(BAR))/3)*σ
CPR	for process capability (inverse of C(P)) value 0 to infinity smaller number means more capable process
FREQUENCY DISTRIBUTION (BAR/HISTOGRAM)	for a sample drawn from a statistical population the number of times each outcome was observed.
K	for process capability studies. Measure of difference between process mean and the specification mean. for k>0 mean above midpoint and <0 below midpoint a value of -1 or +1 means mean of data = to a specification limit and ~ 50% of product is out of specifications. For K >1.0 or < -1.0 mean is outside specification limits. NOTE K DOES NOT DIRECTLY RELATE TO CAPABILITY BECAUSE K MAY EQUAL 0, BUT PROCESS MAY NOT BE CAPABLE (I.E. C(P)<0)
KURTOSIS	measure of how well a distribution is fit by a normal curve. If the curve haslarger tails then distribution with same standard deviation - kurtosis ispositive and curve is platykurtic(see below, conversely if tails are smaller kurtosis is negative and curve is leptokurtic.
LEPTOKURTIC	a frequency distribution which has a higher peak and shorter tails then a normal distribution of same standard deviation
LCL	lower control limit for a control chart, for control charts this is level process remains above when it is in control.
LSL	lower specification limit for measured variable being monitored
MEAN	the average value of some variable
MOVING AVERAGE / MOVING RANGE CHART	a chart having points which are averages or ranges of the previous days data carried forward with the current day. Used to dampen affects of single reading or when current day's production is linked with previous day

NORMAL DISTRIBUTION	see bell curve and kurtosis
PLATYKURTIC	a frequency distribution which has a lower peak and larger tails then a normal distribution of same standard deviation
PROBABILITY	likelihood that a particular occurrence (event) has an outcome
PROBABILITY DISTRIBUTION	relation giving probability of observing each possible outcome of a random event
PROCESS CAPABILITY	level of uniformity of product which a process is capable of yielding
PROCESS CONTROL	maintaining the performance of a process at its capability level
QUALITY CONTROL:	process of maintaining an acceptable level of product quality
QUALITY SPECIFICATIONS	particular specifications of the limits within which each quality characteristic of a product is to be maintained
RANGE	the difference between the highest and lowest of a group of values
SIGMA (σ)	standard deviation of a statistical population
SKEW	a nonsymmetric distribution is said to be skewed
SKEW NEGATIVE	data grouped toward the UCL
SKEW POSITIVE	data grouped toward the LCL
STANDARD DEVIATION	see sigma

STATISTICAL CONTROL	process is in statistical control when it exhibits only random variation
STATISTICAL QUALITY CONTROL	process of maintaining acceptable level of product quality using statistical methods
TOLERANCE	permissible range of variation in a particular dimension of a product
TOTAL QUALITY CONTROL	management system of integrated controls including all departments of a company/plant to ensure customer quality satisfaction and economical cost of quality
TREND	gradual systematic change with time or other variable
UCL	upper control limit for control charts, the upper limit below which a process remains if it is in control
USL	upper specification limit for measured variable being monitored
VARIABILITY	property of exhibiting variation
VARIABLES	quantities which are subject to change or variability