

### How are control limits calculated for an attribute c-chart?

- A c-chart displays the total number of nonconformities for each lot. This chart is available in WinSPC to an attribute that is configured with an 'Attribute Counts' of 'Defects' (also referred to as a 'Defect List') and an 'Inspection Lot Size' set to 'Fixed' (a c-chart requires a constant lot size).

An attribute displaying a c-chart in WinSPC (configured to recalculate the control limits every 5 subgroups) can be seen here:

The statistic plotted on a c-chart chart is

where is the total number of nonconformities found in all the units in the lot.

The following equations are used to calculate the control limits for the k-th subgroup:

Where:

is either

the sum of the total nonconformities divided by the lot size of a set of plotted values (taking into account the 'All Data', 'Last N subgroups', and 'Use local data only' options on the 'Control Limits' tab of the attribute properties), if the 'Est. based on process variables' option is selected under the 'Chart Statistic' area. In other words, represented as an equation:

or, the value entered for the 'Constant' option, if it is selected under the 'Chart Statistic' area.

is the 'Number of sigma' option under the 'Control Limit Spread' area on the 'Control Limits' tab of the attribute properties. By default, this is 3.0.

If the calculation for LCL results in a value less than zero, the LCL is set to zero.

Note that the control limits will recalculate at the interval defined by the 'Calculated every k subgroups' option (25 by default).

For reference for the above control limit settings, here is a sample 'Control Limits' tab of the attribute properties:

<https://knowledgebase.winspc.com/questions/198/>