

Calculation of *Blank limit* in workbook *Calibration*

The *Blank limit* is calculated as the upper confidence interval limit for the blank values at the selected significance level.

$$\text{Blank limit} = \bar{X}_{\text{Blank}} + s_{\text{Blank}} t_{\alpha, \text{one-sided}, n-1}$$

In versions up to 8.1 the significance level were equal to that for the Detection Limit *DL* which as default is 1%.

This means that a result higher than the *Blank limit* will have a probability of α % for in reality being a blank. For $\alpha = 1\%$ this means that one of 100 measurements of a blank sample will be accepted as higher than the blank limit, and in the same way for $\alpha = 5$ or 10% , one of 20 or 10 blank samples will be accepted as not blank. The ‘price’ for the high security ($\alpha = 1\%$) is that the *Blank limit* becomes very high for a low number of blank samples n , see the t-values in the table below:

	Alpha %	Alpha %	Alpha %	Ratio 1/5
n	1	5	10	
2	31.8	6.3	3.1	5.04
3	7.0	2.9	1.9	2.39
4	4.5	2.4	1.6	1.93
5	3.7	2.1	1.5	1.76
6	3.4	2.0	1.5	1.67
7	3.1	1.9	1.4	1.62
8	3.0	1.9	1.4	1.58
9	2.9	1.9	1.4	1.56
10	2.8	1.8	1.4	1.54
10000	2.33	1.65	1.28	1.41

The recommended significance level for *DL* is $\alpha = 1\%$, so in versions until 8.1 of the calibration workbook, the significance level for the *Blank limit* is set equal to 1%.

In the new version 8.11, the significance level for the *Blank limit* can be set in Table 1 in sheet “Input” by the parameter $\alpha(\text{Blank})\%$. So the user can set the limit according to need, or test different values of α . (Change α in sheet “Input” and save the results again – it is not necessary to recalculate one analyte completely to see the effect of α). Default value is 5%.

The risk of loosing a low real value may be more important than accepting a blank as a low concentration sample. Remember that *detected/not detected* is determined from *DL*, so only samples with a concentration $> DL$ concentration will be counted as detected independently of the *Blank limit*.